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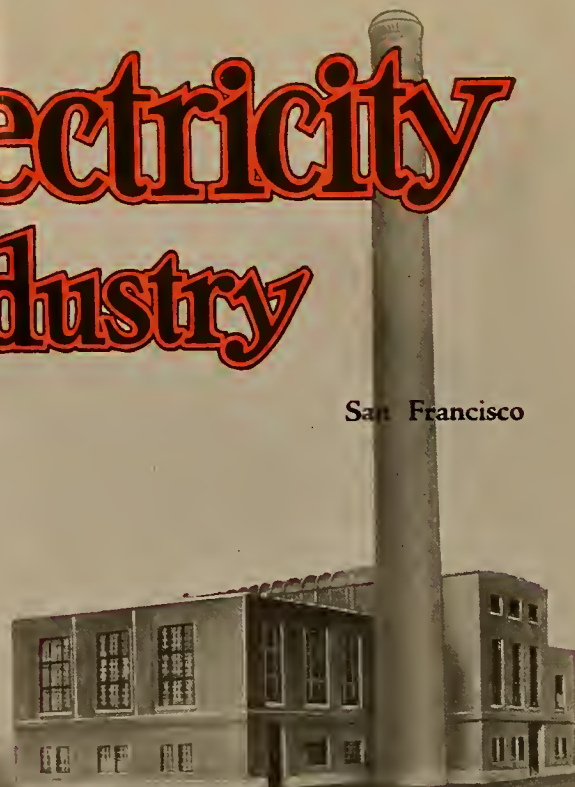
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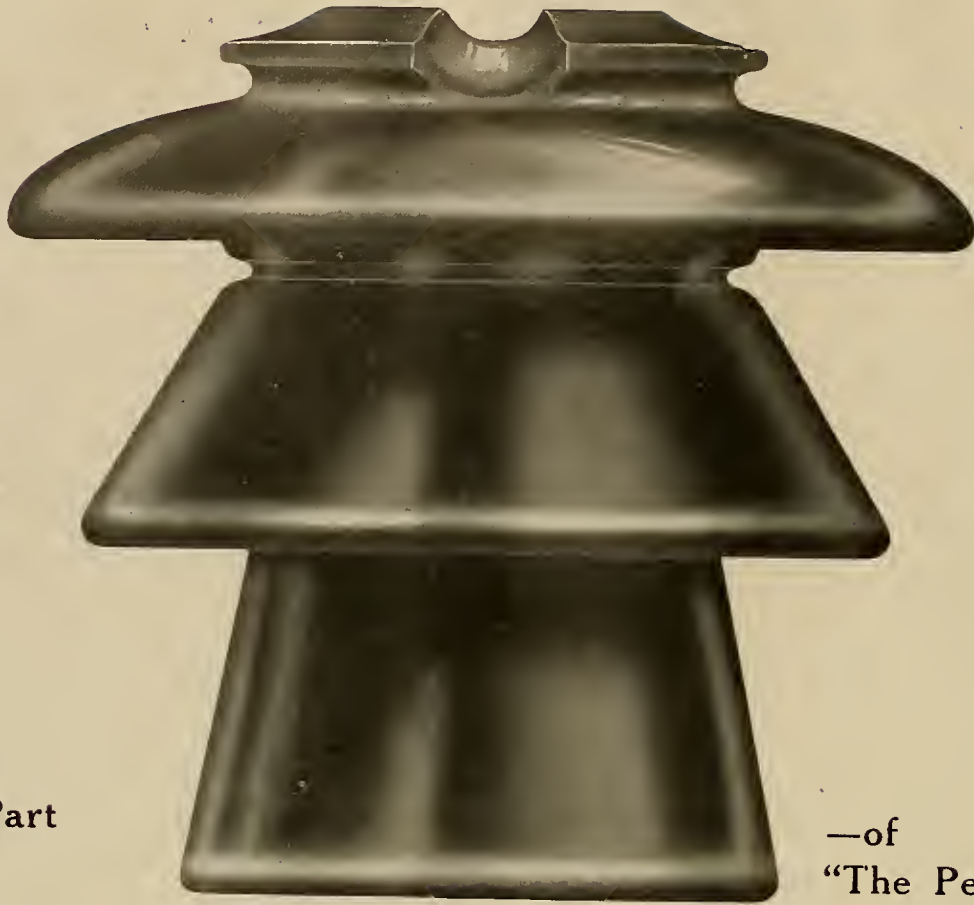


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Journal of Electricity and Western Industry

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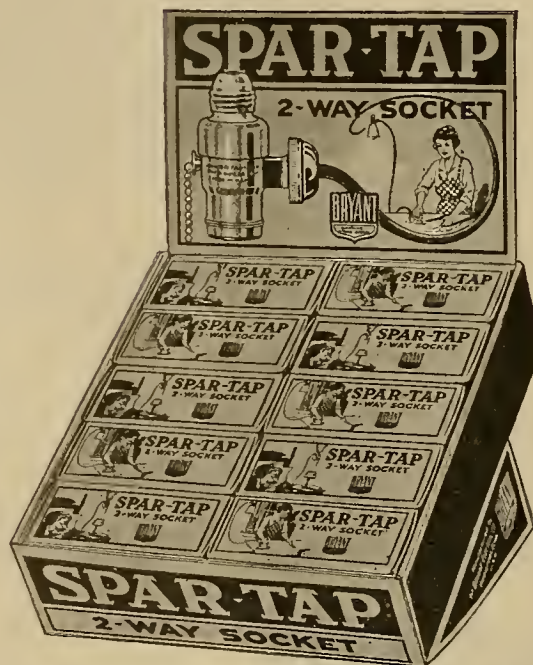
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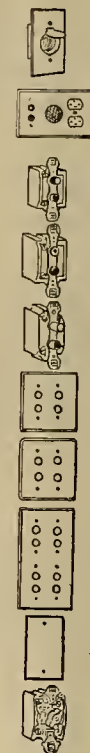
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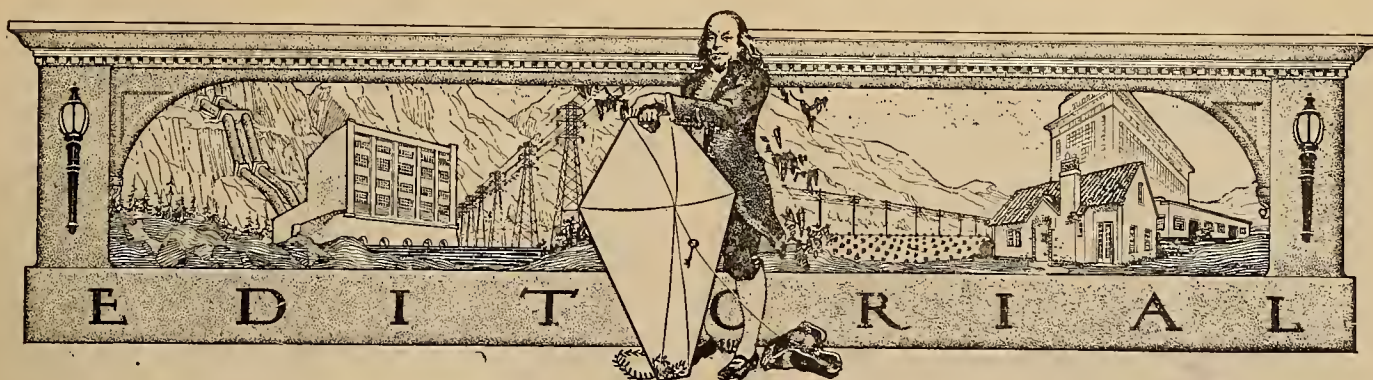
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Happy New Year

JANUARY FIRST, in an industrial sense, means annual reports, trial balances, inventories, and, to the fortunate, a dividend. In an astronomical sense, it means that the earth has successfully negotiated another trip around the sun in its course through aphelion and perihelion, that another step in the precession of the equinoxes has been chalked up on the score board of the ages. In a social sense, in a spiritual sense, the thought of "On Earth Peace, Good Will Toward Men," takes possession of the son of man, and the cheery "Happy New Year" echoes around the civilized world.

SINCE the past is the basis upon which the curve may be projected into the future, let us view the remains of the late 1922, marked, insofar as it deals with the electrical industry of the West, by one major crisis passed, and by a quickening of the pulses of every field of electrical endeavor. This, in itself, constitutes the best possible augury for the future.

THE overwhelming defeat of the Water and Power Act at the polls does not mean that this issue has been disposed of once and for all time. On the contrary, 1923 will see a continuation of the fight. There must be no cessation in the work of enlightening the people as to the direct bearing upon them, their lives, comfort and happiness, present and future, of the continued progressive development of hydroelectric power by private ownership under State supervision and regulation.

THE Electrical Home is a development peculiarly western, in fact, this is one of many instances where the West has blazed the trail of progress for the rest of the world to follow. Blessed with an ample power supply, available at rates lower than those obtaining in any other section of the United States, there is nothing in the way of practically universal application of this idea but human limitations.

THE extension of the community spirit, the cooperative idea, the banding together of kindred interests for self help and for the achievement of higher ideals in their relations to those they serve, is a reassuring indication of the firm foundation upon which is being erected the electrical industry of the future. The many cooperative campaigns now under way in the western states, and the increasing support accorded them by individual electrical interests is the best proof that the idea is sound, constructive, and for the best interests of everybody.

LET us view 1922 in the light of achievement, a real start in the consummation of the highest ideals of the electrical industry, the betterment of the condition of mankind through the increased application of electrical energy. Let us look forward to whatever 1923 has in store for us, confident in the righteousness of our cause, secure in the knowledge that we are building for the future of the West in such a way that coming generations may rejoice in their heritage.

Robert Sibley Becomes Executive

Manager of California Alumni Association

ROBERT SIBLEY, for several years editor, and more recently editorial director of the Journal of Electricity and Western Industry, and Pacific Coast editorial director of Electrical World and Electrical Merchandising, has resigned these positions with the McGraw-Hill Company to become associated in an executive capacity with the alumni work of the University of California.

Mr. Sibley's connection with the McGraw-Hill Company's electrical journals, however, will not be completely severed as he will retain his connection with the Journal of Electricity and Western Industry as consulting editor, and will also act as Pacific Coast consultant to both Electrical World and Electrical Merchandising.

Mr. Sibley's connection with and contributions to the electrical industry in the West are too well known to require extended discussion. Taking up, as he did, the Journal of Electricity and Western Industry editorial work while he was still professor of mechanical engineering in the University of California, he developed the Journal into a western publication rendering noteworthy service in its field.

As executive manager of the Alumni Association, Mr. Sibley brings to this phase of University work not merely a thorough groundwork of experience in University affairs but the ripened knowledge gained through years of contact with western industry in all its phases plus that indefinable something called personality, so essential to one who is engaged in public service.

With these qualifications, it is natural that he should have been unanimously selected by his Alma Mater to assume the leadership in the work of welding together a great body of alumni for the purpose of bringing home to the people of the West a true concept of the University of California, its purposes, ideals, and its direct bearing upon the destinies of the West.

Mr. Sibley is taking with him into his new work the best wishes of his associates in the McGraw-Hill Company, who anticipate that despite the changed relation, they will continue to have the benefit of his ideas, experience and sympathetic cooperation in the consulting capacity which he is now to occupy.

The Journal of Electricity and Western Industry and its Function in the Electrical Industry

BEGINNING with this issue, the editorial staff of the Journal of Electricity and Western Industry will comprise C. T. Hutchinson, acting editor, Norman S. Gallison, George C. Tenney, associate editors, Clotilde Grunsky, contributing editor, and John W. Otterson, assistant editor. With Robert Sibley as consulting editor, and the usual force of correspondents, it is the purpose of the publishers to exert every power at their command to give the electrical industry a medium of expression that will be essentially of the West, by the West and for the West.

Since the development and generation of electrical power by the central station has taken such an important place among industries of the West, and

with every phase of western life from the home to the industrial plant dependent upon energy so produced, there is an opportunity and a need for a publication here whose purpose is the welding together of the diversified interests of the electrical industry. The Journal of Electricity and Western Industry recognizes this opportunity for service and this need as an obligation; that which is best for the industry will also be best for this publication. Every issue will be dedicated to constructive service in this field and while bending every effort to the purpose of being a helpful factor in each branch of the industry, the publishers look forward confidently toward the consummation of higher and higher ideals of service to the electrical West.

Engineering Qualifications for Regulating Bodies

EXCEPTION has been taken, in a communication elsewhere in this issue, to the editorial appearing in the Dec. 1 issue of the Journal of Electricity and Western Industry entitled "Engineering Qualifications Not the Only Ones for Utility Commissioners." The engineering profession—and rightly—has taken the stand that engineering thought is needed in the councils of those who determine the policies and principles governing public utility activity.

This stand has been so consistently maintained by the Journal of Electricity and Western Industry that it was not thought necessary to reaffirm this position. An engineering training would be of benefit to every member of such regulating bodies. There is no justification for the stand too often taken by appointing bodies that an engineer is disqualified because of his special knowledge. As well insist that all judges should be ignorant of the principles of the law.

It is of little avail, however, for the engineering profession to stand about urging the appointment of "an" engineer. There are, as the editorial under criticism pointed out, other qualifications necessary besides a grounding in engineering principles. The reason that so few engineers have been appointed to various commissions in the past has undoubtedly been due to the fact that among the men possessing these other qualifications—men sufficiently prominent to merit their appointment to a position of such responsibility,—there have been four equally available lawyers, editors or business men to every one engineer. Not being sufficiently familiar with the engineering profession to know whom to choose and finally narrowing the choice down to an engineer of no particular standing, proposed merely because he was an engineer, against a non-professional man of outstanding reputation, the appointing body has, and often we think rightly, appointed the business man.

We believe in the ability of the engineer to serve the community—but we do not believe in the tendency toward the development of a class consciousness among engineers which would permit of the urging of the appointment of engineers to positions of importance merely because they are engineers. With this caution to the engineering profession to

consider the other qualifications for the positions in their choice of candidates, the Journal of Electricity and Western Industry hopes to see one or more engineers of admitted professional eminence appointed to fill the vacancies now occurring on western utility commissions.

A Merited Recognition of a Western Scientist and Engineer

THE award of the Edison medal for 1922 to Dr. Robert A. Millikan, Director of the Norman Bridge Laboratory of Physics at the California Institute of Technology, is an act which cannot but meet with the hearty approval of everyone in the electrical industry. The medal is awarded annually by a committee consisting of twenty-four members of the American Institute of Electrical Engineers for "meritorious achievement in electrical science, electrical engineering or electrical arts," and is one of the highest honors which an electrical engineer or scientist can achieve.

Probably the best known and most noteworthy of Dr. Millikan's works are his so-called "oil-drop" experiments, undertaken for the purpose of making precise measurements of the fundamental electrical quantity. These experiments proved conclusively that all electrons are alike and the results obtained have been of inestimable value in the calculations of physical constants.

Second only to the oil-drop experiments is his work on photo-electric effect and his measurement of the "h" constant, which has to do with growth and decay of photo-electric phenomena. This work is recognized as the best experimental check on some of the Einstein hypotheses. His more recent work has tended toward a definite bridging of the gap between light and X-ray phenomena.

Although Dr. Millikan's claim to recognition rests particularly on his experimental researches, his work during the war and in the formation of the National Research Council, on which he served as executive head, are particularly noteworthy. To Dr. Millikan probably above all others is due the credit for whatever good resulted from the activities of America's scientists; he contributed not only from his own great store of knowledge but was largely the driving force which directed the activity of others, including the Government Bureaus, and stimulated individuals to an almost superhuman activity.

Electrical Ordinances Have Not Kept Pace with the Use of Electricity

A TENDENCY toward the greater use of electrical appliances in the home is growing by leaps and bounds. This is not the result of fad or fancy but is an evolutionary movement caused by a change in the mode of living of the American family. The scarcity of domestic servants is but one of the many things which are popularizing the small home and apartment. The complexity of our modern social life makes so many demands on the time of the housewife that she is forced of necessity to call upon electricity for help.

Not so many years ago what have now become essentials in the way of sanitary plumbing were looked upon as luxuries and fads. Electrical appliances are no longer toys and luxuries. Once intelligently installed and used they are seldom discarded. The wiring is as much a permanent part of the house as the plumbing, and the householder is entitled to equal protection in its installation. The average plumber is thoroughly grounded in the subject of sanitation and ventilation. Ordinances specifying that none but a licensed plumber can install plumbing are in force in every town. On the other hand, use of electricity in the home has increased so rapidly that ordinances governing wiring installations are in many cities sadly out of date. Many towns do not license electricians. The result is the overloading of circuits, unsatisfactory and even dangerous installations by high school boys and the like.

The standardization of the wiring equipment of the modern home through cooperation with city inspection departments whereby model ordinances covering installations and licensing may be prepared, is a field which should not be overlooked by the associated electrical interests.

More Adventures in Goodwill Are Needed in the Public Utility Field

A YEAR ago the privately-owned public service companies of Colorado, New Mexico, and Wyoming embarked upon an unique adventure. They set out to reach the goal of public goodwill—to attain a larger measure of the friendship and confidence of their customers.

The unbeaten trail, in places, lay through a wilderness of indifference on the part of those whose goodwill was sought. But self interest was invoked to dispel this lethargy. Frankness and fairness were employed as guides to blaze the way. Newspaper advertising, chiefly, provided the light of understanding.

The Rocky Mountain Committee on Public Utility Information was the instrument through which these goodwill activities were systematically prosecuted. Universities, high and grade schools, libraries and state officials and institutions now turn to it for information. The people in general have been rendered a distinct service. They have a better understanding of how their interests are advanced by fair treatment of their utilities.

This adventure on the part of the utilities of the Intermountain region has no doubt been watched with interest by public utility executives throughout the West. Intelligent men in the public utilities are now generally convinced that in the final analysis it is to their best interest to take the public into their confidence. The demonstrated success of the Rocky Mountain Committee on Public Utility Information has removed this question from the experimental field. It will not be surprising to see similar bodies established in other sections. Let frankness and fairness prevail, let courtesy and square-dealing be the watch-words and the public will be quick to respond.

CURRENT COMMENT



California electrical utilities having annual operating revenues of more than \$250,000 need keep but one set of books of accounts as the result of an order

Rules Governing Utility Accounts Are Changed

of the State Railroad Commission establishing a new system of accounting for these corporations. The new system substantially conforms with that of the Federal Power Commission and embodies sound accounting principles and practices. Under it the companies are relieved from keeping two sets of accounts.

The greatest departure from the system of accounting which is now in effect is the classification of property on a functional basis, or on the basis of what it is used for instead of the material it contains. For example, transmission and distribution systems would now be listed as separate accounts instead of jointly, with sub-classifications for wire, poles, insulators and the like. Similarly, there will be separate accounts for hydro and steam plants under the new system instead of one general account for power plants. Thus, not only are the accounts more easily analyzed but they are more comprehensive and clear.

An exception to the new ruling of the commission is made in the case of electrical corporations which operate only steam generating plants, transmission and distribution systems, or which operate only transmission and distribution systems and also operate gas plants. They may keep their accounts and records during 1923 in accordance with the system now in effect.

Estimated sales of tungsten filament lamps, excluding the miniature type, in the United States during 1922 totaled 205,000,000, which is 3,000,000 more than in 1920, the record year,

and 45,000,000 more than in 1921. Sales of carbon filament lamps are estimated to have been 4,000,000, as compared with

63,000,000 in 1907, the year in which they reached their maximum sales and in which the tungsten type first began to be marketed.

The progress which has been made in the field of lighting during the past year has been summed up by John Liston of the General Electric Company. He points out that the most spectacular development was the production of a 30,000-watt unit, having a capacity of 100,000 mean spherical candlepower for use in experimental motion picture work. This is the largest lamp ever manufactured.

Considerable work has been done toward perfecting a method of coloring bulbs and a weather-proof and fade-proof type has been achieved through the use of a color spray. Highway lighting has been developed to a point where it is now practical and many important applications have been made, especially at grade crossings. Store lighting and school room lighting have both received attention and study. Floor and table lamps are becoming increasingly popular in homes and a new type of semi-indirect portable which bids fair to further popularize the portable luminaire and better the lighting of the home has been developed. Industrial lighting needs have been studied and several improvements made, especially in reflectors.

The sale of approximately 83,000,000 miniature lamps demonstrates the increasing importance of this field of lighting. More than 58,000,000 of these were used in automobiles, while 8,000,000 were incorporated in Christmas tree lighting sets. The remainder were used in flashlights and for miscellaneous purposes.

The field of lighting is becoming highly specialized and as more studies are made of its various phases greater development is to be expected. Based on the results of the past year, 1923 is full of promise in this line.

The relative importance of the various Pacific Coast ports as centers of foreign trade is shown in a survey which has recently been completed by the bureau of

research of the United States Shipping Board. The figures show that while Portland is pushing San Francisco for first place in cargoes cleared, the Golden

Gate city continues to receive almost half of the cargoes entered. The following table shows the standing of the ports both in cargoes cleared and cargoes entered:

| PORT | Cargoes Cleared | Per cent of District total | Cargoes entered | Per cent of District total |
|---------------------------|--------------------|-------------------------------|--------------------|-------------------------------|
| San Francisco, Calif..... | 1,522,605 | 28.0 | 767,787 | 48.4 |
| Portland, Ore. | 1,318,761 | 24.3 | 31,233 | 2.0 |
| Seattle, Wash. | 831,168 | 15.3 | 198,268 | 12.5 |
| Los Angeles, Calif..... | 786,713 | 14.5 | 442,229 | 27.8 |
| Tacoma, Wash. | 228,179 | 4.2 | 105,035 | 6.6 |
| San Luis, Calif..... | 199,953 | 3.7 | ..... | ..... |
| Astoria, Ore. | 130,581 | 2.4 | 18,377 | 1.3 |
| Aberdeen, Wash. | 110,911 | 2.0 | ..... | ..... |
| Everett, Wash. | 75,928 | 1.4 | 1,842 | 1.4 |
| San Diego, Calif. | 71,060 | 1.4 | 13,488 | 1.4 |
| Bellingham, Wash. | 63,994 | 1.2 | 1,121 | 1.4 |
| Port Angeles, Wash. | 44,935 | .8 | 1,833 | 1.4 |
| Port Townsend, Wash.... | 27,668 | .5 | 3,353 | 1.4 |

Lumber, wheat and petroleum are the chief products exported, with the former far in the lead.

There is opportunity for thought in the following figures which show that less than 37 per cent of the cargoes were carried in American vessels.

| Commodities | Exports (in long tons) | | Total |
|-----------------------------------|------------------------|-----------|-----------|
| | American | Foreign | |
| Lumber | 488,104 | 1,107,352 | 1,595,456 |
| Wheat | 154,985 | 943,195 | 1,098,180 |
| Petroleum | 653,138 | 337,461 | 990,599 |
| Barley | 84,607 | 269,358 | 353,965 |
| Other grains | 29,430 | 76,235 | 105,665 |
| Wheat flour | 168,903 | 150,188 | 319,091 |
| Fruit and nuts | 40,393 | 71,020 | 111,413 |
| Iron and steel manufactures | 40,326 | 41,160 | 81,486 |
| Cotton (raw) | 18,680 | 36,241 | 54,961 |
| Vegetables | 32,478 | 15,459 | 47,937 |
| Copper and manufactures..... | 7,429 | 34,886 | 42,315 |
| General cargo | 222,624 | 226,340 | 448,964 |
| Total..... | 1,941,097 | 3,308,895 | 5,250,032 |

Regulations governing the keeping of books for the purpose of determining the information necessary for the proper filing of an income tax return have been issued by the United States

Important Income Tax Regulations Are Announced Internal Revenue Department. The new ruling will undoubtedly necessitate a change in the methods followed by some members of the electrical industry. The regulations follow:

"Every taxpayer carrying on the business of producing, manufacturing, purchasing or selling any commodities or merchandise, except the business of growing and selling products of the soil, shall for the purpose of determining the amount of income under the Revenue Act of 1921, keep such permanent books of account or records, including inventories, as are necessary to establish the amount of gross income and deductions, credits and other information required by an income tax return. The taxpayer shall produce such books of account or records for the inspection of revenue officers duly authorized by law to inspect the same, at such time and in the manner provided by law."

At the recent convention of the Association of Chinese and American Engineers held in Peking considerable emphasis was laid on the losses arising from

Many Problems Confront Chinese Engineers a lack of standardized materials and standard equipment, a problem which is one of the outstanding difficulties in all electrical and other engineering work in China.

Some interesting points in this connection were brought out in a paper on power plant installations, and dealing largely with the problems of generation and distribution. China has now an installed capacity of about 280,000 kw. exclusive of a few very small isolated plants, and the demand for power is increasing considerably faster than the supply. The number of modern cotton-spinning mills alone has more than doubled in the past twenty years, and the market for electrical goods grows yearly.

The irregularity and inadequacy of the power supply, it is stated, is due more than anything else to the lack of standardization in design and equipment in the power plants. In a survey recently made of a number of plants it was found that machinery from all parts of the world was used, with various frequencies and a bewildering assortment of generating and distributing voltages. The efficiency of the steam plants was extremely low, and consumers reported that the variation in voltages received was as much as 50 per cent. This lack of voltage regulation has disastrous result on the motors, which burn out rapidly with the overheating resulting from the

increased current. It is a common practice to install motors which are much larger than necessary in order to allow for the vagaries of the power supply. The economic waste of operating them at from one-half to three-quarter load is obvious.

Another side of the question of voltage drops is summed up in the pathetic report of the Chinese lamp-salesman who complained, "No can sellee plenty much lamp. Voltage low, lamp no burn out quick."

Under the chairmanship of N. F. Brady, president of the New York Edison Company, the radio policy sub-committee of the Public Policy Committee of the N.E.L.A. has undertaken an exhaustive study of the wired wire-less situation, and, in fact, of the entire radio field, in an effort to establish uniform policy for electric light and power company properties with respect to the radio art.

The committee holds that electric light and power companies of the country are interested in radio from two angles: first, radio as it is known today, and, second, radio in the future. It feels that today's problems are comparatively simple, in most cases being purely mechanical or technical ones dealing with the safeguarding of electric light and power company transmission lines and distribution systems from interference and the simultaneous guarding of radio amateurs from injury or possible death, and the safeguarding of property from damage through thoughtless or careless installations of antennae or unwarranted uses of electric light or power lines.

Some of the questions connected with present-day radio practice for which the committee is endeavoring to find an answer satisfactory to the public and the association membership as a whole are:

"Shall the central station get back of the movement and foster radio telephony in the home by installing broadcasting stations and advocating the use of electric lines as antenna?"

"Shall it offer the use of its poles for antenna supports?"

"Or, on the other hand, shall it discourage the use of socket antenna attachments and foster municipal ordinances restricting and licensing the installation of radio receiving sets?"

The committee feels that there is great diversity of opinion upon these points both from the viewpoint of good-will building and from the viewpoint of safety and service standards.

With respect to future developments the committee is now collecting data and having experiments made by leading manufacturers in order to find answers to the following problems and questions and confidently expects to have these answers in hand within the next year:

"Will the development of 'carrier current' make possible the use of existing light and power lines for purposes never before contemplated?"

"Will the transmission line serve also as a telephone and control channel, to communicate with the distant station and to operate its equipment?"

"Will the street lights of the future be controlled by carrier current transmitted over the distribution mains?"

"Will the radio set of the future operate on the lighting circuits in the home and receive its impulses over the same circuits by carrier currents?"

DISCUSSION



Engineers Disagree with Editorial on Utility Commissioners' Qualifications

To the Editor:

Sir: The Public Affairs Committee of the San Francisco Chapter of the American Association of Engineers was much interested in the recent editorial in the Journal of Electricity and Western Industry on the subject, "Engineering Qualifications Not the Only Ones For Utility Commissioners."

We heartily agree with your conclusion that to recommend that engineers "be appointed merely because they are engineers is exceeding the bounds of sound reasoning."

We do not entirely agree with your description of the ideal commissioner, however. You state that he "must be honest and sincere, he must possess integrity, he must have a knowledge of the law, a knowledge of business, and above all, he must be an able and competent judge." These are all to the point, but why should he not have knowledge of engineering as well as the law and business? It is admitted without question that most of the testimony offered before the commission is by engineers and that the greater proportion of the staff work done on cases is by the commission engineering department. While it is true that this organization is a splendid and well-equipped one, it cannot be gainsaid that two commissioners, who are also engineers, would be most helpful in digesting rapidly and effectively the enormous masses of technical detail which are embodied in the engineering reports coming before the commission.

Furthermore, the commission has legal and financial departments as well as engineering. Why, then, do members of the commission need knowledge of the law and business but not engineering? Is the engineering department so much better able to advise with commissioners than other departments that the members of the commission need only to have a previous groundwork in law and business?

With regard to the quality upon which you lay greatest stress, namely, that a commissioner "must be an able and competent judge," we maintain that the engineer's training and experience fit him pre-eminently in this respect. It is to be remembered that utility bodies rarely exercise their judicial functions with respect to principles of law, but rather in passing on questions of fact and business procedure. A judge, according to Webster's dictionary, "is one who has skill, knowledge or experience sufficient to decide on the merits of a question or on the quality or value of anything." This the engineer does every day of his life. He is continually weighing the relative merits whether it be of plans, materials, locations, value, or the ideas and contentions of men.

If he were to be influenced in his decision by the insistence of clients, salesmen, or subordinates rather than merit, he would not practice long as an engineer.

It is our view, that the engineer who has attained eminence in his profession by training and experience naturally acquires the judicial temperament and that able and competent judges can be found in the engineering profession just as readily as in the legal.

Therefore, it is the firm belief of this committee that a substantial volume of the problems with which the commission has to deal, involve in their consideration and solution, a proper and consistent understanding of engineering principles, not only in their technical aspect but more particularly in their broad and orderly application to the economic and business principles involved in the matters brought before the commission; and it is the further belief of this committee that the professional engineer is particularly fitted by training and experience to grasp understandingly the problems, to analyze and co-ordinate their elements and in a judicial manner to deduce logical and equitable conclusions, thereby contributing materially to the efficient functioning and service of the commission by being included in its membership.

In conclusion, this committee confesses to a mild surprise that a journal usually so devoted to the interests of the engineering profession should have failed to appreciate the primary qualification of engineers as potential material for public utility commissioners.

PUBLIC AFFAIRS COMMITTEE,
San Francisco Chapter, American Association
of Engineers.

By CHARLES H. LEE, Chairman,
NEWELL CHARDE,
LOUIS F. LEUREY,
GEO. D. WHITTLE,
T. A. HOPKINS.

San Francisco, Calif.
Dec. 15, 1922.

Let Convention Delegate Report to the Entire Local Section Membership

To the Editor:

Sir: Your editorial, "Solidarity in National Engineering Society Development," in the Oct. 15 issue of the Journal of Electricity and Western Industry, pleads for representation of local sections in the national conventions of the societies. The

value of such representation can not be over-estimated in the interest of cohesion.

However, full advantage should be taken of such representation and every effort made to develop its full value to the sections and members as well as to the society as a whole. With that object in view, it seems that at least one section meeting each year should be set aside for the discussion of the activities of the national society.

Such a meeting, at first, might be held soon after the return of the delegate from the convention and center around his report on the sessions of the convention. At present, he reports presumably to the executive committee of the section, but the members in general glean little or no information and consequently take slight interest in the society's affairs and policies.

After the interest of the members has been awakened by such post-convention meetings, there will probably develop a demand for preconvention meetings so that delegates may go to the convention instructed on specific measures or at least with a clear knowledge as to the attitude of the section on important matters.

Such meetings offer the only means by which sections and members, remote from national headquarters, can secure genuine representation and achieve an active part in the affairs of the society, adequately expressing their needs and desires.

L. N. ROBINSON.

Seattle, Wash.
Dec. 17, 1922.

Educate Both the Electrical and the Non-Electrical Merchants

To the Editor:

Sir: In view of the action taken by various contractor-dealers' associations and electrical leagues in recognizing retail outlets other than those strictly electrical, providing certain standards are maintained, does it not seem advisable to encourage a better understanding on the part of those dealers other than electrical on the basis on which electrical goods should be merchandised?

The field of operations has been qualified in the preceding question because that is the subject of this communication. As a general proposition, it is only too well known that the electrical man is the one needing education on merchandising rather than the hardware or department store proprietor. But in this particular case the point is that of driving home to the industry two things which the latter types of merchants must accept and put into practice.

The cut price problem arises not as a cause but as the result of an improper conception of these two outstanding factors. It would therefore appear advisable to consider these two factors, buying and servicing, as fundamentals.

Unless the store is one so large that it has a separate and complete electrical department, appliances, lamps, etc., are handled by some other supposedly related department. In the case of the department store one may find electrical merchandise in the furniture, hardware, art, house furnish-

ings or other departments. In the hardware store electrical goods are usually classed with the hollow ware, staples or specialties.

It is only logical, then, under the circumstances, that the buyers for those departments supervise the procurement of electrical goods. But here is where the logical seems to conflict and it is the place where the manufacturer and jobbers' salesmen can make their services really felt. With ample stocks available at a nearby jobber's there is no reason why the department store representative should over-buy unless it is because of ignorance. The jobber's salesman should not allow the buyer to lose his head under any circumstances. He should make it clear that hardware or aluminum goods differ materially from electrical merchandise and that smaller stocks must of necessity be bought if a fair profit is to be made on the turnover. Electric washing machines and percolators cannot be bought and sold like trunks and jewelry or furniture and notions!

If standard prices are to be maintained under normal circumstances adherence must be made to this system, or otherwise a cut price sale is staged. The right to reduce stocks is recognized as a principle of good merchandising but not in condonation of extravagant or ill advised buying.

Whether longer discounts would aid or hinder this condition is a question open to debate.

Servicing is the other factor. What percentage of department stores have adequate servicing facilities for the electrical equipment of appliances sold by them? Very small, indeed. And yet the electrical dealer and the central station, to make any kind of a success, must be in a position to service anything, from curling irons to washing machines. Apparently too many department stores consider the sale itself as being the alpha and the omega of the transaction. They do not anticipate the necessity of rendering at least twelve months' satisfactory service.

Many department stores handling electrical equipment have phonograph departments. And in nearly every case experts on the repair and upkeep of those musical machines are found in the organization. The same should be true in those places handling vacuum sweepers, washing and sewing machines, and all types of motor driven devices, not to mention the line of heating appliances.

If the customer is to have that satisfaction to which he is entitled in the use of electric equipment or appliances—if the popularity of those devices is to be developed—if the industry as a whole is to be elevated to the position it properly should enjoy—service must be rendered. The instilling of this knowledge in the minds of the department store people must be made.

As a matter of self-protection, the rest of the electrical industry can properly demand this—but only after its own house is in order. So why not educate the department stores and help them while the electrical dealer is being helped, to the end that both will profit to the extent they serve?

S. W. BISHOP,

Executive Manager, Rocky Mountain
Electrical Cooperative League.

Denver, Colo.,
Dec. 17, 1922.



Water from the melting snows of Mount Hood will turn the turbines in the Oak Grove power house of the Portland Railway Light & Power Company when completed. Seventy-five thousand

and kilowatts of electrical energy will be made available to meet the demands of the rapidly growing territory in Portland and vicinity served by this progressive company.



Insuring the Growth of Portland

By W. C. Heston

THE completion of the Oak Grove hydroelectric project by the Portland Railway Light & Power Company will bring into Portland a block of hydroelectric power which is very much needed to meet the demand of the growing territory served by that utility. The company at the present time operates four principal hydroelectric plants having an aggregate capacity of approximately 75,000 hp. and two auxiliary steam plants in Portland having a total generating capacity of approximately 25,000 hp. One day during September of this year the peak on this system was approximately 65,000 kw. which is the greatest in the history of the company, thus indicating that the yearly peak which ordinarily occurs during December or January will far exceed that of any previous year on record.

The Diversified Load in Portland

It is interesting to note that the generation curve of this utility has climbed steadily upward in spite of the period of depression which followed the war, when the cessation of activities of the many shipyards, having a load of 5,000 or 6,000 kw. and a monthly consumption of approximately 2,000,000 kw-hr., took place. The explanation for this fact is that the uses for electrical energy, in the territory of 300,000 population served by this company, are so diversified and the growth of the community in the past few years has been so rapid, that the deficit caused by the loss of war industries has more than been absorbed. Resident and apartment house building has been very active, particularly during the past

ELECTRIC public utilities must look far ahead in their construction plans to meet the demands which the future will bring upon them. Anticipating the growth of its territory in Portland and vicinity, the Portland Railway Light and Power Company is spending ten million dollars to insure ample power, in order that this growth may not be retarded.

year, and nearly all modern apartment houses being built in the city of Portland are being equipped with electric ranges. There is now an apartment house electric range load of several hundred kilowatts with over 500 electric ranges on the lines of this one company alone. In addition, electric range and water heater sales for residences have been very active.

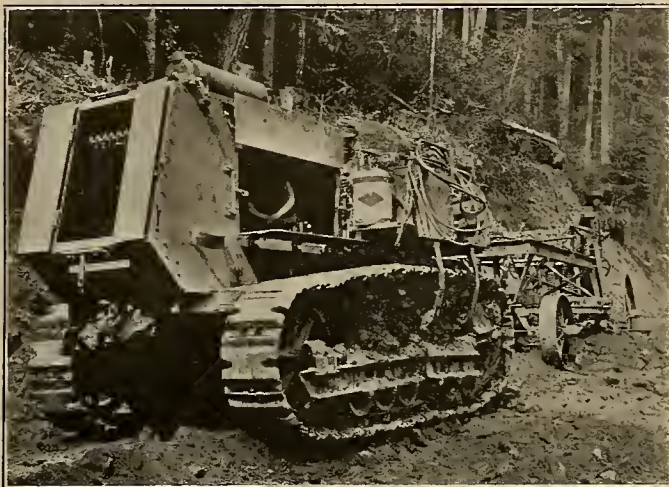
The Oak Grove project is one of the largest hydroelectric projects under construction

in the Northwest at the present time. This plant, which will be situated on the Clackamas River about 60 miles southeast from Portland, will have an ultimate capacity of 75,000 kw. The first unit of 25,000-kw. capacity, will be completed and placed in operation during the early part of 1924, according to present plans.

The company recently placed the order for the hydraulic turbine for this first unit. The turbine, which will be of the vertical type, will have a capacity of 35,000 hp. and operate under an effective head of 857 ft. This unit, which was ordered from the Pelton Water Wheel Company, will be of the Francis or reaction type and will constitute a world's record, both in capacity and operating head for a reaction turbine. It will be similar to the hydraulic turbines at the Kern River No. 3 plant of the Southern California Edison Company. The units at this plant are of 25,000-hp. capacity, operating under a head of 810 ft. An order has just been placed with the General Electric Company for the first generating unit. The generator will be of the vertical type,

rated at 30,000 kva., or approximately 25,000 kw., 11,000 volts, three-phase. Three 10,000-kva. transformers will step up the voltage to 66,000 volts for transmission to the main distributing substation in Portland. Later when the other two generating units are added the transmission voltage will be raised to 115,000 volts.

This project will be unique among hydroelectric projects of the West in that the plant can be operated at full capacity 24 hours a day and for 365



Holt Northern Caterpillar tractor used for pulling stumps and grading

days a year. In other words, the possibilities of water storage are such that the plant can be operated at a load factor of practically 100 per cent. No provision for water storage is being made in connection with the installation of the first unit as the natural flow of the Oak Grove Fork of the Clackamas River is sufficient for the operation of this unit. As the demand for power increases in the territory served by the company, the second and third units will be installed, in connection with the construction of storage reservoirs, one on the Oak Grove Fork and the other on the main fork of the Clackamas River. A 3-mile tunnel will be constructed to divert the water from the storage basin on the main fork of the river to the forebay at the intake on the Oak Grove Fork. The regulating of the flow of the Clackamas River by the storage reservoirs and the release of this water through the turbines at the Oak Grove power house will also make possible a much greater generation of power at the two existing plants on the Clackamas River during the low water period. The first unit will cost about \$3,000,000 and the ultimate development approximately \$10,000,000.

The initial step in connection with the first unit was the construction of a 25-mile wagon road from the end of the company's present interurban system at Cazadero to the intake dam on the Oak Grove Fork. This road is now approximately 75 per cent completed. The building of a wagon road through the Clackamas River Canyon to the site of this development presented some unusual difficulties due to the fact that solid rock was encountered for the greater part of the distance. The comparatively

short dry season during which road construction work could be carried out advantageously made it necessary during the past summer season to make the greatest progress possible. This was done in order that materials could be transported to a distribution point approximately midway between the site of the power plant and the intake dam so that construction work at the power house and the intake might proceed during the winter.

Owing to these facts, and since it was necessary to follow the steep banks of the stream through a narrow valley in a region so rough and inaccessible that construction equipment could be gotten to the proposed line only at the lower end, an unusual procedure in road construction was employed. By operating in the usual way at one end of the work only, the desired speed could not be made and consideration was given to getting small power shovels up the river on barges so that grading could be carried on simultaneously from several different points. A still better plan was finally worked out whereby a small gas-electric shovel was advanced very rapidly over the proposed route, followed by a similar shovel that widened the roadbed and was in turn followed by still another shovel, a standard size steam shovel, that could handle the heavier grading in an economical way.

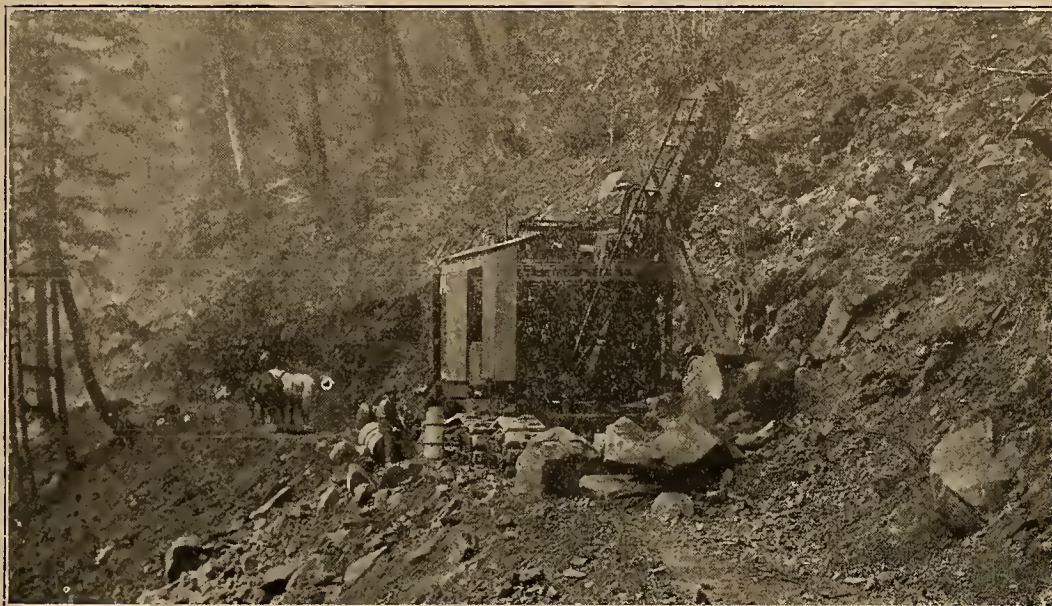
The first step was to clear the right-of-way and at the same time grade by hand methods a trail wide enough to accommodate a wagon with a 3½-ft. tread. Two such wagons were built and used to convey supplies to the clearing camps maintained ahead of grading operations. The first shovel was a Model 21 Marion gas-electric. It began at the lower end of



Log crib bridge over Three Links Creek near site of the proposed power house

the work and did just enough excavation to enable it to move ahead. In this way, by working three eight-hour shifts, it was advanced 8½ miles in 2½ months, leaving a roadbed for the most part about 8 ft. wide. The crews ahead of this shovel, in addition to clearing the right-of-way, blasted rock making it ready for excavation, using heavy charges so as to facilitate handling with the ¾-cu. yd. dipper. Holt northern logger tractors working behind the shovel were used to remove stumps and pull graders.

A pioneer shovel of the gasoline-electric type followed the narrow trail made by the advance crews.



A second shovel followed and increased the width of the road. Width was sacrificed for speed.

A steam shovel following the two advance shovels increased the roadway to full width.



The second shovel was started out immediately after the first but was expected to handle more yardage and make slower progress. It cut the grade to the prescribed 5 per cent maximum and increased the width of the bench cut to 14 ft. except where long slides or excessively heavy grading was encountered. A steam shovel of standard size came last and completed the work, handling the bulk of the yardage where the cut was deep and heavy.

Gas-electric shovels were selected for the advance work because of the low haulage cost on fuel of this grade and also because of the low fire risk during the summer season, which was an important consideration. At first the light for night work was supplied by a generator driven by the main engine. As this left the work in darkness when the main unit was broken down, a separate lighting system was provided consisting of a Delco storage battery set mounted on a sled. From this leads were run to projectors and lamps placed on the shovel or convenient points about the work.

Only two men were regularly employed on each gas-electric shovel; one of these operated the control mechanism while the second acted as helper and made himself generally useful on the ground.

The work was taken over by the present contractors on May 8. Two and a half months later the first shovel had progressed 8½ miles, the second 6½ miles and the steam shovels had done some very heavy work.

The last operation in the construction of the road is to be the placing of a 15 to 18-in. rock base covered with crushed rock and rolled with 10-ton steam rollers.

The plan of construction by successive stages was worked out by the Hurley-Mason Company, contracting engineers, Portland, Ore., who are constructing the road under contract for the Portland Railway Light & Power Company. The construction

of the road will cost approximately half a million dollars and during the past season eight camps were maintained and approximately 1,500 men employed.

Construction Program Large

In addition to the money spent on the Oak Grove project, the company has spent during the year 1922 over \$2,000,000 in betterment on substations and the transmission and distribution systems. Approximately a third of a million dollars has been spent on the installation of protective relays alone. This protective relay system will not increase the revenue of the company one cent, but is being carried out solely in the interests of reliability of service.

Approximately three-quarters of a million dollars is to be spent in the construction of transmission lines and outdoor transmission line switching stations. Eleven thousand-volt tie lines will be constructed throughout the city and will be tapped, and stepped down through outdoor substations, located near the center of load in the various residential districts. This will relieve the overloaded conditions of the present 2,300-volt residential feeders radiating from the old established substations. The installation of a 3,000-kw. steam plant in the city of Salem in the upper Willamette Valley has just been completed to supply this city in case of failure of the transmission lines coming from the hydroelectric plants in the vicinity of Portland.

In order to assist in the financing of the Oak Grove hydroelectric project and the large construction program just referred to, the company is offering to the public in the territory it serves \$10,000,000 of prior preferred stock. The first \$1,000,000 block of this stock has nearly all been disposed of through the employees of the company. A permanent stock sales organization is maintained and as rapidly as the issues are subscribed others will be placed on the market to finance the company's large construction program.



Illustrating the varied character of the country in the Clackamas River canyon. A large part of the road had to be blasted out of solid rock cliffs. Short sections similar to the center view were encountered where construction was comparatively easy. Rock and mud slides were not infrequent. In one instance a steam shovel was completely buried.

Department Store Methods for Merchandising Washing Machines

PICKING haphazardly from among a list of maxims, proverbs and adages, one which best describes the activities of A. A. "Washer" Wilson of Los Angeles in the disposal of washing machines, one might say, "It's the exception that proves the rule." In this case the "rule" is the well established principles and practices of merchandising washing machines as the electrical industry knows them. "Washer" Wilson may not violate all of the principles and practices, but it is a certainty that he sells washing machines in a manner that differs from that of any of his competitors. Moreover, if the reader doubts Mr. Wilson's ability to dispose of equipment for laundering the family linen let him ponder the following facts. In the 13 years that he has been in business, "Washer" Wilson has sold over 1,000 carloads of electric washing machines.

There is a touch of romance to the story of Mr. Wilson's success in his chosen line. In 1909 he escorted three of the pioneer dolly-type electric washers into a room on the seventh floor of a down town office building in the city he had selected for his home. During that first year his gross sales amounted to a paltry \$5,000, but he learned a lot about selling. During 1922 his sales totaled 130 carloads, the estimated retail value of which is approximately one and a half million dollars. The game was not new to him, though. He was born 44 years ago at Reinbeck, in the native state of most of the world's washing machines, Iowa. For the first twenty years of his life he worked from morning to night on his father's farm. His ambitions, however, pointed toward business and he finally broke away from the farm and took a two years' course in business college, working his own way. Two years of general office work added greatly to his fund of business experience. Then he started to learn selling. The lines he handled while on the road included everything from fancy pottery to farm machinery.

It did not take long for Mr. Wilson to realize that the man in business for himself had the most opportunities. With this in mind he organized the



A. A. Wilson who, as "Washer Wilson, is known throughout the Pacific Southwest as the foremost merchandiser of electric washing machines.

Wilson-Galloway Company at Waterloo, Iowa, handling buggies and farm implements. At the end of a year he sold out and organized, with his brothers, a wholesale neckwear establishment. Two years later his career became mixed up with washing machines. The Wilson Manufacturing Company began to make a hand-operated washing machine. Mr. Wilson was now on the road that has led to business success in the years that followed.

The first venture was not along a path strewn with roses. Shortly after the hand washer was put on the market, a new electrically-driven machine arose to challenge its popularity. Mr. Wilson was not slow to recognize the possibilities of the new machine but he realized that its production called for more capital than he had available. It was natural that he should sell out the factory and start selling the new washer. He chose the West as the seat of his operations and moved to Los Angeles with the agency for one of the pioneer electric washers.

Before he made his decision to build his career around electric washing machines, Mr. Wilson was thoroughly sold on the electrical idea. He had purchased one of the first electrics made and had given it a trial in his own household. They were a novelty, to be sure, and the housewife would require education before they would gain popular acceptance, but they represented a tremendous future sales volume. Experience has shown that he was right. At the present time he not only sells more washing machines than any other single retailer, but he has fifteen stores and is planning to open five more.

To go back to Mr. Wilson's violations of the established rules for merchandising washing machines. In the first place, he employs no solicitors and uses no prospect or mailing lists. He depends upon newspaper advertising alone to bring the prospective purchasers into his store. He does not demonstrate his washing machines in the home nor does he specialize on a free trial offer. Above all, he sells washing machines only,—no side lines, no specials. He does not employ outside men because he be-

believes that solicitors are the bane of a housewife's existence. He feels that the majority of women would rather do their buying in a store rather than listen to sales arguments when they should be doing housework.

"Washer" Wilson does all his advertising in newspapers because he does not wish to scatter his advertising money and because he wants to be in a position to know absolutely when his advertising is not exerting the proper pull. When he first started selling washing machines he could not afford to use other mediums. Since then he has never felt it necessary to employ them.

Through the newspapers he can get his message to the public with the minimum expenditure of energy and in the shortest length of time. Concentrating on this one medium he can use larger space, give it more attention and become more familiar with getting his message into type. Besides, if sales do not come, he knows immediately what medium is at fault. It cannot be any but newspaper advertising and instead of trying to find the guilty one in a group of methods, he can instantly place his finger on the plug that is not functioning.

An Advertising Copywriter

Mr. Wilson writes all of his own advertising himself. He has done this since he started in the business and even though he has been assured by experts that he could obtain this service at a slight cost he will not change his system. His sales are based on advertising and he feels that the responsibility is his own. In writing his own copy, Mr. Wilson has put across his biggest sales idea. Although his parents gave him two names, the initials of which call for A. A. before his name, he does not use them. Through his advertising he has taught the public to think electric washing machines and "Washer" Wilson at one and the same time.

He is equally careful in his choice of newspapers in which to advertise. In Los Angeles he uses the morning papers only on Sunday. During the week he advertises extensively in the evening papers. He does this because he has found that the working man and the housewife read the evening papers

during the week. He is most interested in telling his story to the housewife who has to do her own washing, not to the one whose circumstances are such that she can send the family wash to the laundry. In the smaller communities where his branch stores are located he uses the local papers.

Until a short time ago, the practice on the part of dealers of giving a free trial of the washing machine which they handled was popular. "Washer" Wilson has never countenanced this plan nor does he believe it to be effective.

One of his early decisions was to stick to his line. He decided to sell washing machines and not to cloud his reputation with numerous other lines. Since then temptations, backed by merchandising logic have come, but he has turned his back on them all. He could have handled sewing machines. He had the space. He could have pulled more business by offering bargains in sets of aluminum. He has been offered almost every conceivable line on every conceivable sort of a basis. Manufacturers have asked him to take on stocks of lawn mowers, lamps, refrigerators, ranges, and many other articles. He was temptation proof, which is saying a great deal, for there are few dealers averse to taking on a side line which appeals to the same class of buyers as they are already catering to.

Another reason for this was his desire to have every man in his organization a washing machine expert. His salesmen know washing machines, and this knowledge enables them to achieve the maximum efficiency in selling them. He pays his men for this and he pays them well. They work on a salary and bonus basis, with the salary more important than the bonus. Mr. Wilson once said:

"If my salesmen are worth \$500 a month to some one else, then they are worth \$600 a month to me."

His salesmen are well satisfied, too. Practically every man he has ever employed is still with the organization.

Servicing the machines he has sold is an important part of conducting such a business. Mr. Wilson made no charge for service during the first eight years he was in business. When the number of



A solid trainload of electric washing machines, 35 carloads, comprising the largest shipment on record, sent from the

A. B. C. ELECTRIC WASHERS



5 MODELS
\$99⁰⁰
And Up

Payments as Low
AS **\$500.** **\$700**
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WASHER WILSON 13 Years in
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Inglewood
Riverside

A picture of the article to be purchased, the price and the terms for which it may be bought are the essential parts of "Washer" Wilson's advertisements, which he writes himself.

machines he had sold became so great that special men had to be employed for servicing alone, then he devised a schedule of nominal service charges, all of which are less than the actual cost to him. In Los Angeles alone, he maintains two service cars.

Eighty per cent of the machines he sells are purchased on terms. He has a liberal credit policy. To him the number of dollars in the bank account or the size of the pay envelope are unimportant. A man with half a dozen children he considers a fine risk. He looks upon the housewife who wishes to buy a washing machine as a thrifty, industrious and steady person who wants to pay her bills. In spite of his liberal credit policy his losses from bad accounts will not reach one-fourth of one per cent of his total annual sales.

In analyzing the spectacular growth of Mr. Wilson's business two of its outstanding characteristics seem to be specialization of effort and generalization of stock. The entire organization has been built around washing machines. They are the only commodity handled and every member of his staff is a specialist on this one subject.

Balancing this specialization is the scope and all-inclusiveness of the stock. All types of washers are included. It has never been the method of Mr. Wilson to accept exclusive agencies, to try to force the product of one manufacturer upon his customers, or even to favor one type of machine over any other. It is his object to carry in stock what the people want in the washing machine market. He will handle any good machine for which there is sufficient demand. But the machine must be a good one. The success of his business and the good will which he has created depend upon the sturdiness and the dependability of the machines which he sells. He has certain definite standards which the machines he handles must meet and there have been cases where manufacturers have altered their product to make them meet these standards.

In view of the tremendous outlets which he has created, the buying power, efficient distribution and quick turnover possible through his organization, he can buy in great quantities. He holds the world's record for a single shipment of washing machines, 35 carloads, 2,500 machines worth \$300,000.

"Washer" Wilson is highly enthusiastic over the future of the washing machine business. He does not claim to have any particular corner on success in this business, but maintains that if any responsible dealer will take hold of a good line of washers, devote the proper amount of attention to it, and advertise it correctly, the returns will be highly satisfactory. As he puts it, "Rent, advertising, salaries or commissions and service are the items which must be figured out accurately if one is to make a success of the specialty business."

Mr. Wilson has demonstrated that he knows whereof he speaks for not only does he conduct a highly successful business but he is known as the "Washing Machine King" of the Pacific Southwest.

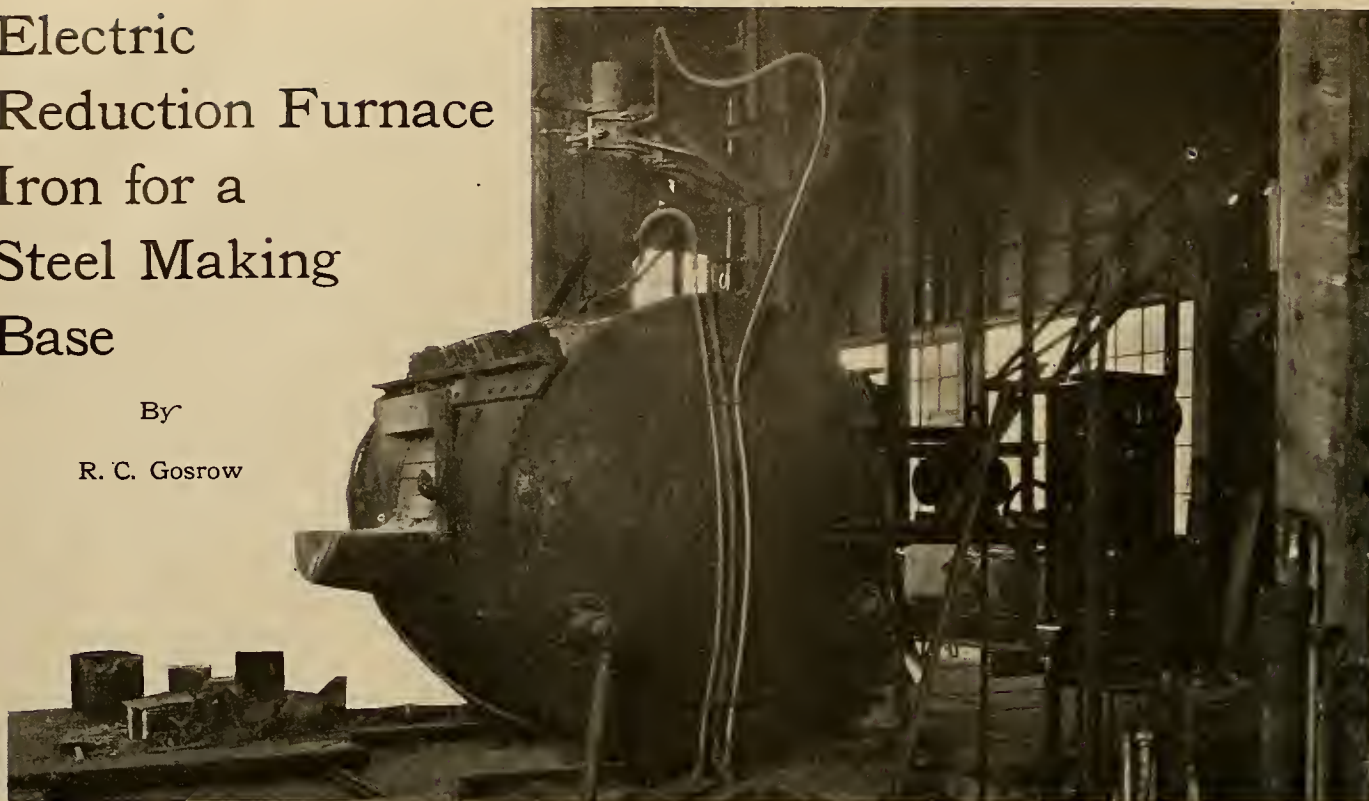


A.B.C. factory to "Washer" Wilson. The shipment moved via the Chicago & Northwestern and Union Pacific systems.

Electric Reduction Furnace Iron for a Steel Making Base

By

R. C. Gosrow



THE electric reduction process for producing iron direct from iron ore, is by no means applicable to all localities. The cost of electric energy, the limitations imposed as a result of unit furnace capacity, the cost of raw materials and the relative proximity of available markets for the sale and consumption of the product, are some of the factors which collectively tend to make the process prohibitive in one region, and economic and operative in another.

In the Pacific Northwest of the United States, and the Province of British Columbia in Canada, the natural conditions and the resources, and the proximity to consuming markets for the product, make the establishment of the electric furnace reduction process a reasonable certainty.

The Northwest regions and other Pacific Coast districts also, possess extensive deposits of smelting iron ores, limestone, dolomite, magnesite, clays, coal, and wood waste to utilize for charcoal. In addition to the ores of iron, there are large deposits, developed and undeveloped, of the ores of manganese, chromium, molybdenum, tungsten, nickel, material for silicon alloys. These minerals are available to transportation from several localities. They represent the raw materials for ferro alloy production for steel manufacture. Water power resources, developed and undeveloped, aggregate millions of horsepower. The proximity of water powers, and extensively developed hydroelectric energy, to the natural mineral resources, are existent. The distribution of electric energy to built-up communities is well established, for industrial purposes.

The geographical locations of built-up and established rail and water transportation centers, interconnecting to all Pacific Coast points, harmonizes

every factor essential to manufacture iron, viz.: electric energy at a consistent rate, raw materials, labor markets, commercial contact, proximity to consuming markets, ability to compete with imported products. With these advantages the electric iron reduction furnace has a specific application to a region.

Compared to an iron blast furnace the initial cost of the electric furnace equipment is less. An apparent disadvantage of the electric reduction furnace is attributed to its small unit capacity, compared to a blast furnace of an economic capacity. But this apparent disadvantage of unit capacity resolves itself into a strong factor of advantage, in the production of iron for a steel making base. A small unit may be operated in a most flexible manner, and at the same time profitably. It is always capable of conforming to the demand for iron, without the accumulation of large tonnages of "stock iron."

In the production of steel from steel pig, the use of the electric reduction furnace iron is economic. The economy of making a heat of steel (.10 to .30 carbon) in an open hearth furnace, is dependent on the rate of melting the charge, and the time required for refining, and the time required to fix the analysis for the product. I refer to the open hearth furnace, because all tonnage steel in the West is so produced, and these furnaces would constitute the demand for pig steel melting stock. In melting steel scrap of low carbon content (.15-.25) the higher temperature of melting, required by the low carbon charge, as compared to a carburized iron of 2.2% carbon, makes the fuel cost ratio higher, also furnace refractory deterioration is greater. Melting a steel pig charge, does not necessarily imply a 100% charge of steel pig, but the charge will contain at least 85% steel

pig. By melting a charge of 85% steel pig, due to a lower melting temperature of the charge, the furnace melting temperature is not maintained or driven so high at the start. Lower flame temperature, and furnace temperature lower, results in lower fuel cost, lower refractory maintenance cost, and lower steam and air cost for oil consumption.

For steel pig the range of analysis may be:

| | |
|-------------------------------|------------|
| Carbon total | 2.00—2.25% |
| Manganese | .50—1.00% |
| Silicon | .40— .80% |
| Sulphur and phosphorous under | 0.050 each |

Pig steel may be cast in sand, machine cast in steel molds, or cast in slabs and broken with a skull cracker. The metal so produced will be tougher than the blast furnace irons of higher carbon and lower manganese contents. For the same silicon content the grain will show a finer structure, in the electric furnace iron. Although in the white electric irons the fractures are not so widely different from the blast furnace irons, it is in the higher silicons that the different structures are pronounced. It establishes the necessity of grading all electric reduction furnace irons on analysis only.

In the electric reduction furnace, pig steel can be produced at less cost than foundry irons. The unit capacity of the furnace can be of a quantity, so as to be capable of supplying a steady market on a twenty-four hour production load. A 20,000 ton a year furnace can produce steel pig within the buying range of the steel producers on the West Coast.

The use of steel scrap for making steel will not discontinue. By the supplementing of pig steel, where steel scrap is often scarce, and of necessity at a high price, it will stabilize the market for steel scrap, conserve the available supplies, which are quite regular in their cycle of turnover, and to a certain extent revamp the scrap process for open hearth steel making, with advantages in economy and product. The net result to the steel maker will be: a supply of virgin metal, the option to refuse scrap which he considers too low grade to pay for the refining, the elimination from the manufacturing cycle of iron products, materials which were carelessly or conditionally produced.

When steel production tonnage is at normal rate, the demand for scrap is active. In the large eastern steel making centers, the scrap melting stock finds its market and consumption close to the place of scrap production, for the big markets for steel consumption are also the big markets for scrap production. The cycle is completed within a comparatively small area. At the same time virgin metal is constantly being produced, by necessity.

The utilization of the iron producing resources of the West and Northwest are a certainty. The electric reduction furnace has a specific application, under the conditions as they exist, for raw materials, demand for product, and existing markets, of limited and varied demands. The raw materials are at hand, and the thrift of the industry will eventually demand the utilization of these valuable close-to-hand materials for its local supply of iron, for steel making base.

Successful Gasoline Electric Car Is Designed for Swiss Railroad

AS THE result of efforts to manufacture a self-propelled railway car which would combine the utility and flexibility of the electric car and the low installation cost of the gasoline car, Swiss engineers have developed a new car which is said to combine these principles successfully. The car is so designed that the gasoline motor, which is a 200-hp., four-cycle Sulzer engine of the new RV type, can be operated at almost constant speed thus favoring the most economical fuel consumption.

The actual motive power is electricity, a specially designed electrical transmission system mak-



Self-propelled gasoline electric car which is being operated between Winterthur and Frauenfeld, near Zurich, Switzerland

ing variable speeds possible without changing the speed of the gasoline motor.

Under trial tests the car has been found to be extremely economical to operate. The fuel consumption for 1 km. is, when no trailer is attached, 0.6 kg. of gasoline, or approximately 0.262 gal. per mile. Thus a storage capacity of 350 litres (92.47 gal.) would be sufficient to give the car a traveling radius of about 500 km., or 314 miles. Running on a level roadbed, the car, without trailer, can attain a speed of about 44 m.p.h. and with a 20-ton trailer 37.5 m.p.h. can be reached without overcrowding the motor.

The most extensive tests made on the car were conducted on the line between Winterthur and Frauenfeld, near Zurich, Switzerland. The distance between the two towns is 10 miles and on the trip to Frauenfeld from Winterthur, 1.85 gal. of gasoline were consumed. Returning 3.44 gal. were used. Thus a total of 18 kg. of gasoline were used and at the prevailing price of 12 francs per 100 kg. the cost to run the car 20 miles was 2.20 francs or 44 cents.

The car is constructed to operate on standard gage track and is fitted with two driving platforms thus permitting it to be run on tracks where turntables are not available. There are seating accommodations for sixty-nine persons and in the aisles there is standing room for sixteen more. The total length from the front to rear buffers is 70 ft. Five axles are used to support the weight of the car which is approximately 65 tons.

ELECTRICITY IN INDUSTRY



By Louis F. Leurey
Industrial Electrical Engineer

Industrial Applications of Electric Arc Welding Apparatus

THE art of electric welding is now so far past the experimental stage that its use is becoming standard in many fields of industry, as both the equipment and method of application have been vastly improved in the past couple of years. It is,

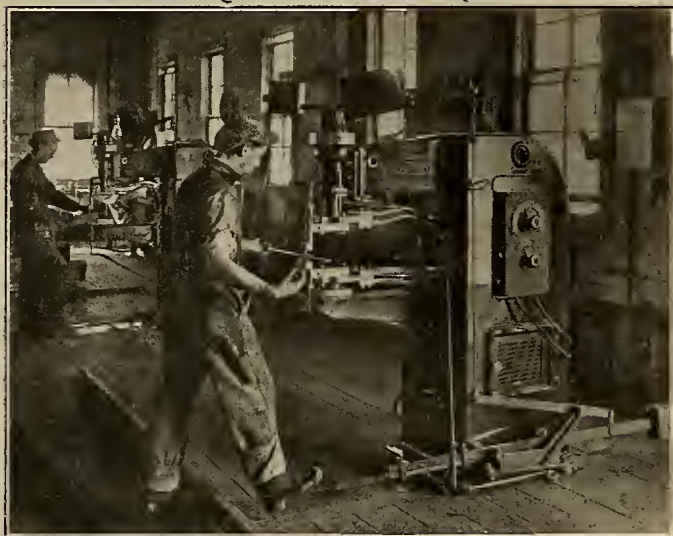


Fig. 1—Spot welding outfit in the plant of the Columbia Wire & Iron Works, Portland, Ore.

of course, without question true that the process of gas welding will never be completely supplanted by the electrical process because in certain classes of work gas welding has many advantages which will always insure its use. In the same way, electric welding is rapidly developing a distinct value in its field which is pre-eminent over any form of gas welding, and the scope of this field is being widened daily by the conviction which has come to manufacturers from seeing the equipment in actual use.

In the heavy manufacturing field of the eastern states, electric welding received a great impetus during the period of the war. The ship building industry especially found that many irregular pieces which enter into ship construction could be electrically welded with more speed, less labor, and less total cost than by riveting, and use of electricity in fabrication shops became very extensive in many ship yards of the country.

The locomotive industry about this time also made rapid strides in the knowledge and application of electric welding, finding its two principal advantages to be, first, that work could be done on heavy locomotive parts in place, thus preventing the enormous cost of disassembling the machine; second, that the character of the work was such that it left the metal in perfect condition for machining, trimming, or polishing.

About this time, also, many manufacturing companies found that in the fabrication of light sheet steel parts electric welding apparatus could be used with greater advantage than any other devices for assembling these light parts, and manufacturers of electrical equipment especially went very widely into the use of spot welding. A spot welding outfit in operation in the plant of the Columbia Wire & Iron Works, Portland, Ore., may be seen in Fig. 1, which illustrates very clearly the remarkable degree of development this type of welding has reached.

A photograph showing a portable gas driven outfit in use in southern California, reproduced in



Fig. 2—The portable outfit, pictured above, does electric welding where central station power is not available in southern California.

Fig. 2, shows that the value of the welding process has become so well established that its use is not confined entirely to fields where central station service is available, and its advantages for special classes

of work are such that warrant the high cost of the portable truck and the gas driven generator set.

The field for the application of welding sets in many of the minor shops of the country has been retarded largely due to the fact that it has been difficult and expensive for individual welding equipment companies to properly demonstrate the actual commercial utility of their various machines. It would seem that the time is now ripe for some combined effort by manufacturers of welding equipment, central station companies, and all other members of the electrical industry to initiate steps looking toward central demonstration laboratories at convenient points in large centers of population where these outfits could be demonstrated through all the range of their capacity.

Steel Tower Sections Are Joined by Electric Welding Outfit

THE application of electric arc welding to original manufacturing, as distinguished from salvage and repair work, is growing rapidly, and, as pointed out in the previous article, it will play a larger and larger part in industrial fabrication of iron and steel.

According to Howard L. McLean, of Stockton, Calif., a cave in Calaveras County is the scene of the latest achievement along this line. Here, 200 ft. underground, is a steel tower (Fig. 3) 100 ft. high and nearly 7 ft. in diameter, containing a spiral stairway. Neither bolts nor rivets were used in its construction, as it is electrically welded throughout.

A 300-amp. a.c. welding outfit mounted outside the cave was used in making the 7,221 welds in the tower. One of the greatest difficulties encountered was the conveying of the three tons of steel used, to the point in the cave where the tower was built. The entrance and long passageway to the great central chamber are so narrow and tortuous that no steel bars longer than 20 ft. nor wider than 14 in. could be taken in. This maximum size could only be handled with great difficulty. In addition, material could only be taken as far as a rocky shelf upon which the passageway could be opened, 90 ft. below the earth's surface. This shelf is in the wall of the cave, 100 ft. above the floor. Men and material for the building of the tower had to be lowered from this point to the cave floor by an electric hoist. This shelf also is the upper landing platform of the stairway. Here, a block of reinforced concrete supports two 10-in. I-beams extending out into space. From them, four $\frac{3}{4}$ -in. plow steel cables were dropped to the floor 100 ft. below.

Lengths of machine steel $\frac{3}{8}$ -in. x 2 in. were then rolled and welded in the form of hoops. At four points on the circumference short pieces of pipe were welded on. The pipe guided the hoops in slipping down the cables. At 10-ft. intervals the hoops were held in place by pouring babbitt into the pipe around the cables. The cables were anchored to the floor of the cave in a block of concrete 8 ft. in diameter and $4\frac{1}{2}$ ft. thick.

The lattice work enclosing the stairway was

then started at the bottom. Flat steel bars $\frac{1}{4}$ -in. x 1 in. were used, making one complete turn between each two hoops and crossing at intervals of one foot. In the place of one spiral running from the bottom to the top of the tower, two $\frac{3}{8}$ -in. x 2-in. steel strips were substituted. These served as the outer support to which the 150 steps were welded. The other



Fig. 3—This underground steel tower in Calaveras County, Calif., is entirely electrically welded

end of the step was shaped and welded to the core of the tower.

Ten-foot sections of 10-in. pipe, electrically welded together, formed the core. This was welded to a bed plate set in the same concrete block that anchored the cable.

One feature of the construction is compactness. The tower serves not only as a means of reaching the floor of the cave but also as a means of ventilating, draining and lighting. The 10-in. center pipe carries the fresh air supply for the cave. It also serves as a conduit for the electric light wires which are led out at intervals along the pipe for lights. A $\frac{3}{4}$ -in. pipe forms a spiral around the center pipe. It serves as a handrail and also as a drain for the seepage water from the platform, preventing the whiteness of the natural formations underneath the platform being discolored.

The invention of the methods of welding construction used and the general design of the tower are due to the construction engineer, A. H. Tange-mann of Stockton.

JOBBER, DEALER AND SALES AGENT



While There's Credit There's Hope

By L. R. Ardouin

Electrical contractor-dealers of San Francisco presented this play before the San Francisco Electrical Development League on the annual Electrical Contractors' Day. The play was written to point out some of the weaknesses of the present credit system under which the electrical industry is operating.

CAST OF CHARACTERS

| | | | | |
|--------------------|---|--------------------------------------|---|----------------|
| Felix Slick | { | Composing the Fly Electric | { | C. F. BUTTE |
| Cap Gyp | | Company | | C. B. KENNEY |
| Charley Nickum | { | Sales Virtuoso, Boobs Supply Company | { | C. J. NEWBERRY |
| Arthur Eczema, | | Swindle Sheet Composer, | | ARTHUR DAHL |
| Francis Malaria, | { | Bunkem-Joshem Company | { | FRANCIS WATTS |
| Earl Halitosis, | | President Boobs Supply Company | | E. E. BROWNE |
| Clyde Cretin, | { | President Bunkem-Joshem Company | { | CLYDE CHAMBLIN |
| Tony Minestrone, | | A customer | | GUS BARACO |
| Rodolph Vasselino, | { | Almost the same | { | H. ROSENBERG |

Twinge I

Show Room, Fly Electric Company.

[The scene opens on a modern electric shoppe, both antique and modern. It is sparkling in its vivacious cleanliness and reeking with the dust of skulduggerous tradition. It is here that rainbows are chased and appliances prescribed with the exact methods prescribed by the cooperative campaign. But we find among its neatly arranged shelves and its sleek carpets, three suave men, all shouting raucously and sordidly clawing for gain. There is a charming desk, a perfectly sweet vacuum cleaner, a purring washing machine, a glittering electric iron, and a contracting department ready with its scalpel.

Cap. Gyp is ready with toes on the mark waiting to sell another appliance. Arthur Dahl passes him a cigar salesmanwise.]

Cap. (in Rollo language): Well, Art, old boy, there's a nice order for you. Remember, just because you are giving me an extra ten per cent that does not mean we get all junk.

Art: You know our service is de luxe, Cap, and as for quality, it's the angle worm's eyebrows.

Cap.: Well, Mr. Halitosis is a fine fellow, despite all the publicity given him by the Listerine people, and I like to do business with you.

(As Art starts to make a stagey exit Felix Slick enters, the acme of oily impeccability and calculating glad-handedness.)

Felix: H'lo, Art, old boy, just landed another school house. (Pumps Art's arm with great vigor.) I want some stuff right away.

Cap. (aside): Another school house landed. Another donation handed. Another purse disbanded.

Art (scenting commerce): Have you seen our new household utility, combination hair curler and atomizer? No chilly spray delivered on your whiskers. It heats the spray and makes permanent water waves in your hair.

Cap. (a new appliance on the market makes him delirious): Send up a dozen if they're good.

Art: Our new combination pancake turner and Ford jack is a bear.

Cap.: Send up a dozen.

(Art writes up an order like the allied demands and leaves.)

Felix. You shoulda been up to the association meeting yestiddy after noon. Chamblin was low on the Electrical

Building, but we scared him off. He doesn't know how to figger. Its a shame what these contractors don't know about figgerin', or anything at all. He thought the Electric Development League was a new school for physical culture.

Cap.: How did we stand?

Felix: Sitting on the throne at the top, as usual. I must have figgered something twice. (Searches for dandruff.)

Cap.: Tha'ss the trubble. The contracting 'end of this business, if I may use the expression, is too darn hazardous (blushes). Always taking a chance and what do we get? Always taking our choice between getting a job and losing something or losing a job because we figgered out on paper what it really would cost us and then losing because we didn't get to cut last.

Felix: How comes it that we are in that condition? Say, if it wasn't for the contracting end of this business, we'd be closed up long ago. It looks to me like we're running a service station for the jobber. I'd like to see something tangible in the way of profits.

(Charley Nickum frowsily unruffled enters, bides a wee to register profile, then nervously deliberate, salutes demurely, chaste and purely.)

Charley (in tones mysterious and slithery): Hello, boys. If Mayor Rolph asks for me on the phone, tell him I'm out of town. (Charley exits.)

Cap.: Well, I'm getting in a line from some out of town jippers. I just received a bunch of Jap goods for the holiday trade and closed on the exclusive agency for this block on a combination victrola and fireless cooker. It's called the Pyrola. Music with my meals always did appeal to me.

Felix (answering the telephone): H'lo. Yes, Felix talking. Yes, yes, yes, yes, yes, yes. I'll talk to the book-keeper (gags mouthpiece, blows dust off set of junk books, searches awkwardly with free hand). (To Cap.): It's Halitosis. He wants money.

Cap.: Stall him. He's too fresh.

Felix: Mr. Halitosis. We sent you a check month before last, didn't we? Our terms have always been 190 days with you. Oh, no, your salesman said to pay whenever we felt like it. (Dramatic pause.) Well, I tell you what you do: You put that check back through the bank again. Maybe they'll honor it this time. (Slides on the receiver and sighs.)

Felix (looking at the mail): Bills, bills, bills; it looks like an Elks' convention. Not a check in the whole outfit except the one on the Pacific States Trade Mark. If I don't land a job soon, we'll be broke.

Cap.: Yes, and wait a year for our money. Well, cheer up, maybe I'll sell a washing machine.

Felix: Yes, and get paid \$1 down and \$1 eventually, and pay \$2 to collect every fifty cents.

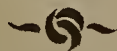
(Francis Malaria enters, the epitome of peppy versatility. He is a commanding type of salesman who specializes in opening the dead leads and closing the hard ones, a go-obtainer.)

Cap. (with forced joviality quite apparent): How's the Bunkem-Joshem? Heh, heh!

(Francis repartees hackishly and bursts a bottle of champagne over the bow of his gold medal selling talk and slides her down the ways, but somebody forgot to fill the ocean with water and he falls down like a day-old glass of root beer.)



This new household utility is a combination hair-curler and atomizer which heats the spray and makes permanent water-waves on a bald head.



Your creditors have ordered you closed up. (right)



This iron has an attachment which consumes all odors.



Dassa iron no good!



We better treat him well; maybe we can use him later.



He thought the Electrical Development League was a new School of Physical Culture.



We trusted them, We trusted them, and we never collected a cent.

Cap.: Call around again, Francis. (Aside to Felix): Better be nice to him, maybe we'll need him later. (To Francis): We're pretty well hooked up now. Nothing personal, y'understand, but, not just now.

(Charley Nickum enters.) Charley: I'm going up to a private session of the board of supervisors. If Bill Crocker or any of the Spreckels boys calls up, tell them to call me up at my home.

(Charley exits like Houdini.)

Felix: Yes (up the scale), yes, yes, yes, yes. (To Cap.): It's Halitosis again. He wants money.

Cap.: Shoot him the hop.

Felix: Well, there must be something wrong, Mr. Halitosis. We'll send you another check right away. Oh, no, no, no, no, no, it'll be on a different bank this time.

Cap.: He's getting too fresh. It makes me sick the way those jobbers chase the dough. You'd think that's all they were in business for—to make money. Their salesmen come in with a lot of bunk and tell us what wonderful service they give.

(Tony Minestrone enters. He's a customer, never mind what he looks like. He talks Neapolitan English.)

Cap. (with the proper approach): What can I do for you?

Tony: I'm going to build a little house.

Cap. (with grandiose wave): Ah (raising eyebrows), ah! I shall introduce you to our contracting electrical engineering manager. (Sweeps Felix forward, who comes up beaming.)

Felix (still beaming): Yes, a house. There are a few things I would advise. First, everything in the best conduit and at least six convenience outlets in every room including the attic. Now, your wife will want an electric range, washing machine and ironer.

Tony: You don't understand, I just want to buy a pair of hinges.

Cap.: Let me show you this new electric iron. It's a wonder. It is guaranteed for ten years. (Cap. spreads eagles for an hour, and blabs Tony into a sale.)

(Tony exits.)

(Charley enters.)

Charley: If there are any telegrams from the executive mansion, send them out to Captain Dollars' hunting lodge to me.

(Telephone rings as Charley exits.)

Cap. (answering telephone): Yes, Mr. Halitosis. We'll be right over.

(To Felix): He acts irritated. Let's go over and see him.

Felix: All right, anything you say. But there are plenty of other jobbers. [Curtain.]

Twitch II

Office, Boobs Supply Company.

Halitosis (lion-like): Send 'em up. I've been waiting for them.

(Enter Felix and Cap.)

Cap. (magnanimously defiant): Well, here we are.

Halitosis: Well, we might as well get down to business. I have a few words to say and you might as well hear those few right now. I suppose you know the condition of your account on our books?

Felix: Sure, we keep books.

Halitosis: Well, I've received promises, notes and checks which have never been met and before I commence any action against you, I'd like to give you a chance to say something for yourselves.

Cap.: We haven't anything to say.

Felix: Sure, go ahead and sue us. We haven't anything on our shelves that we didn't buy from you. You've been getting all our business. Isn't that enough?

Halitosis: It would be fine if I got any money for my goods.

Cap.: We have to repair pretty near every appliance we sell. It eats up all the profit.

Halitosis: Well, it's not my fault. Either make some cash settlement or we sell you on a c.o.d. basis.

Cap. and Felix (in unison): All right, anything you say. (They exit.)

Halitosis (calling up Cretin of Bunkem-Joshem):

I've just told the Fly Electric that they are on a c.o.d. basis. I thought that might be interesting information for you to govern yourself by. I'll come right over now and give you the details.

(Exits.)

[Curtain.]

Twist III

Same as Twaddle I. Six months later.

Charley (to Cap.): Here's some cards to give out to your friends. I expect to be pretty busy the next month or so. I was the last one to file. The boys coaxed me so hard and even the sheriff himself wanted me to do it. So I'm going to take a try. I'm going up to a private session of the board now. Tell anybody who calls I'm out of town till tomorrow.

(Exits immediately.)

Felix (entering with roll of plans): Well, here's where we chase another rainbow.

Cap.: Yeh, that's about all you do. You must wear out about a gross of lead pencils and a square mile of shoe leather every month chasing jobs.

(Art enters and tries to be cheerio. His reception is as pleasant as a rubber pancake.)

Cap.: Can't you see I'm busy? Get out.

(Art exits most assiduously.)

Felix: I'm glad we switched to Bunkem-Joshem. I never did like that guy, anyway.

(Enter Rudolph Vasselino): I want to buy an electric iron. One that I can fry eggs on in my hotel.

Cap.: Sure, we have one here that has an attachment to consume all the odors. It's guaranteed for ten years. It sells for \$5.

Rudolph: Maybe you have one slightly damaged you could sell cheaper.

(Cap. almost has talked him into an order when Tony enters.)

Tony: Say, here's that iron you sold me. It doesn't work well. It nearly killed my family. I thought it was guaranteed for ten years.

Cap. (stalling): Sure it is. Maybe you didn't use it right. Maybe the children were playing with it. We'll let it heat up. (Attaches it to plug.) While it's getting hot let me show you this masticator, the new washer made by the Horace Fletcher Company. (Tries to start it and it falls to pieces.)

(Cap. goes from a warm to a cold sweat. Every appliance that he tries to show goes phoney. Finally the iron itself blows up and the customers exit disgustedly.)

Charley (comes in with a ray of sunshine): Well, boys, it looks like I'm in. Let's all go out and celebrate.

(They exit.)

[Curtain.]

Twitter III

Office of the Bunkem-Joshem Supply Company,
Amalgamated, Credit, Ltd.

[Cretin and Halitosis seated at desk together, mournful objects.]

Cretin: Here we are with all our money and assets in one pot and trying to make both ends meet just on account of one contractor.

Halitosis: Doggone the Fly Electric. Misery loves company. Even after I told you how they got into me, you took them on and gave them credit; but I'm willing to let by-gones be by-gones. All our help laid off and doing the work ourselves. It's too bad.

Cretin: They stalled me and stalled me. I couldn't sue because they didn't have anything. (They sing to the tune of The Expurgated Rhapsody.) I trusted them and trusted them and never collected a cent.

Cretin: If we go down we'll take them down with us.

(Gets Fly Electric Company on phone): Yes, all of you guys come right up here. The whole darn firm. (Slams receiver on hook.) We'll give them a nice surprise and close them up with fireworks. (Calls sheriff's office.) Send down the sheriff himself right away. We have important business for him.

(Cretin and Halitosis watch clock for twenty-nine minutes.)

(Enter Felix, Cap and Charley.)

Charley: Did you call for me?

Cretin: Yes, the three of you.

Charley: I was just on my way down here, anyway. My deputy gave me this (starts to unroll sign).

Halitosis: What's that? Waw-waw, what's the idea?

Charley: That's a notice of sheriff's sale. Your creditors have ordered you closed.

Cretin: What are you doing with it?

Charley: Don't you know? I was elected sheriff yesterday and I'm serving this notice for the benefit of your creditors. [Curtain.]



One of the tables with heaters installed by the H. L. Miller Company of Pasadena, Calif., in the park where election returns were broadcasted

Election Heating Installation Advertises Dealer

Wires and wireless were used by the Pasadena Star-News to broadcast the returns in the recent election to the crowds gathered in Library Park adjacent to the newspaper's offices at Pasadena, Calif. At the same time the H. L. Miller Company, electrical contractors and dealers, used wires to spread the advertising message of the company.

Even in sunny southern California the nights are cool in November. In Los Angeles the gas company advertises the coke which is a by-product of gas manufacture by burning briquettes in open grates before its offices on cold evenings. One of the newspaper staff noted this practice and decided that it would prove an effective means of supplying heat to those who intended to watch the election returns supplied by his paper. However, the gas company was not interested in advertising its products in a city which it did not serve.

The newspaper man spoke of his difficulties to H. L. Miller, who immediately recognized a chance to advertise his own appliances. Mr. Miller agreed to supply sufficient electric heaters for the purpose, provided the newspaper would arrange for the power supply. The municipal light department offered to give the current free of charge and install the power outlets.

Mr. Miller constructed four large tables, each capable of holding six "Cozy Glow" electric heaters. Over

each table a large sign was hung giving the name of the heater and the company which furnished them. Throughout the evening from seven o'clock until midnight, hundreds of people gathered about the tables, warming themselves. A great deal of good will for the firm was created and the advertising value of the installation was inestimable. A number of sales directly traceable to the installation were made during the days immediately following.

Mention of the cooperation of the contractor-dealer was made twice during the days preceding the election in the editorial columns of the paper.

SOME SNAPPY NEW YEAR RESOLUTIONS

By JOE OSIER

Now that "Kid '22" has taken one on the point of his withered jowls and gone for the Big Sleep and—

"Kid '23" has been crowned King for a year—

Men engaged in the Electrical Industry can turn a smart trick by retreating into themselves and spending a few minutes in composing some high-class resolutions to govern their actions during the coming twelve months.

By this, I do not mean that they should resolve to forego buying bonds or brew—fore swear cards, cursing or gum chewing or that they should promise to walk the straight and impossible path until—

Comes the time next year for making a new set of fragile promises.

Personally, seeing that I have already resolved to swear off swearing off, I am willing to let the namby pamby promises go to pot and content myself with a set of high-class resolutions which any fair-minded man of business will keep, in order that his business may prosper.

To be brief, which I hate to be, seeing that I am barely started on this column,—

I would, if I were engaged in the Electrical Industry, adopt the following resolutions and—

I would practice and preach them from dawn until darkness every day of the year which has just arrived.

1.—I shall be just to my employees, giving them a fair share of that which they so willingly produce. I shall be considerate of their feelings. I shall reward their ambitious efforts.

2.—I shall be fair in my dealings with men who favor me with their business. I shall not attempt to flay them, skin them, nor will I flim flam or double cross them in any way.

3.—I shall throw a calloused eye on Overhead, watching this item as a mother watches her babe; as Uncle Sam watches Mexico. Yea, verily, I shall keep it down to a minimum, consistent with good business practices, in order that I may continue growing and prospering and waxing wealthy.

4.—I shall pay my dues in my Association, attend all meetings, participate in all Association activities. I shall lift my voice in council—wisely if possible; however, either way, I shall lift it.

5.—I shall subscribe to and read the columns of publications published in the interest of the electrical trade, knowing, full well, that brighter men than I am Gunga Din, have consumed many hours of time and kilowatts of current in the preparation of articles and editorial comment which are meant to aid and abet me. Again, Verily, I say: Their brains and head muscles shall not have been organized and co-ordinated in vain.

6.—I shall not "use" with the "curb-stone" electrician;—that lowly wight who carries his shop in a satchel. To him I shall accord short shrift. I shall avoid him as though he were the Flu-monia or the palsyals.

7.—I shall not buy jobs. If my services are not worth something—including some money, I shall find myself a busy corner and an empty can. While contracts are going for nothing, I shall sit in my shop, free from the fear of the sheriff, and practice rolling muzzle loading cigarettes with one hand.

8.—I shall keep the above resolves, knowing that I shall be rewarded with a fair portion of the gate when the receipts have been counted on the last day of the last month of this year. And, further, I shall rest assured in the knowledge that my cash register will not be worn out from ringing "No Sale."

Selah! I have said it!

| | | | | | |
|--|-------------|---|-----------|---|-------------------|
| SOLD TO <i>Smith, Mrs. A.F.</i> | | ADDRESS <i>1715 Fedora Ave., Fresno</i> | | WATER HEATER | |
| MOVED OR TRANSFERRED TO | | | | YES | |
| MAKE <i>Hotpoint</i> TYPE <i>11RA67</i> SER. NO. <i>18494</i> | | INSTALL. # <i>100</i> | | PURCH. FROM <i>Pac. St.</i> | |
| SOLD BY <i>Downing</i> DATE <i>9/18/22</i> PRICE \$ <i>223.50</i> CASH | | P. O. <i>9605</i> DATE <i>7/17/22</i> | | | |
| SPEC. DISCT. | | WHY? | | SERVICE UNTIL <i>9/14/23</i> | |
| INSTALLED BY <i>US - Petty</i> DATE <i>9/14/22</i> | | INSTALL. COST \$ <i>54.63</i> | | LIST \$ <i>223.50</i> COST \$ <i>173.25</i> | |
| ELEMENTS | WATTS | DATE | REP. ORD. | WATTS | NATURE OF REPAIRS |
| FRONT R | <i>1500</i> | | | | |
| C | | | | | |
| L | <i>1000</i> | | | | |
| REAR R | <i>440</i> | | | | |
| C | | | | | |
| L | <i>1000</i> | | | | |
| OVEN T | <i>1500</i> | | | | |
| B | <i>1500</i> | | | | |
| BROILER | | | | | |
| MISC. | | | | | |
| NAME <i>Smith, A.F.</i> | | ADDRESS <i>1715 Fedora</i> | | Fresno | |

Fig. 1—Water heater record card of the Valley Electrical Supply Company

Selling Service with Heavy Electrical Appliances

Fresno Firm Insures Against Lengthy Operation Interruptions
by Recording Data on Electrical Devices Marketed

Supplying a service which permits the selling of extra elements for electric ranges, much the same as spare tires are sold to automobile owners, has been the policy of the Valley Electrical Supply Company of Fresno, one of the most progressive electrical stores in central California. Every effort to make the sale of all electric appliances a lasting one and one which will attract more business to the firm has been applied by this company.

Because much of the business that is handled by the company comes from the agricultural territory surrounding

Fresno, ample precautions to provide continuous service, from the appliances sold, are necessary. Farmers living some distance from town are urged to purchase extra elements in order that their electric ranges may suffer no interruption of service. Detailed instructions as to the installation of the spare elements in the range are given the purchaser and he is thus able to keep his electric range in order. Any serious trouble must, of course, be referred to an experienced electrician.

The service provided is based upon the idea that the sale of electric ranges

or any other piece of electrical equipment, is not ended when the customer has paid the bill for the goods. The experience of the company has taught H. H. Courtright, manager of the concern, that the sale of one electric appliance will often lead to the sale of many other appliances, each a larger investment than the previous purchase, if the customer is well satisfied with the first purchase. From the observations made, the company realizes that to secure more business it is first necessary to completely satisfy and even anticipate the wants of its customers. Thus the policy of servicing and of providing for possible breakdown of appliances has come as a natural result.

The servicing policy of the Valley Electrical Supply Company starts when the sale of the range is completed. When the range is delivered, all information in regard to it is entered upon a special card form, a sample of which is shown (Fig. 1), indicating the type, nature and size of elements, and other information which gives the company complete data concerning the range at the time it left the store. These blank forms when filled in are sent to the range department where they are filed alphabetically according to the customer's name. In this way information concerning any purchaser's range is always available to the men in charge of the department. Should any spare parts be needed it is not necessary for a man to go to the home of the range owner to ascertain the type and size of replacement part necessary, but the card record enables him to secure the information at the company's office. This also prevents the waste of time occasioned by a man taking the wrong sized part to the customer, as his requests for parts are always checked against the blanks in the range department's files.

| | | | | | |
|---|--|-----------------------------------|----------------------------|---------------|--|
| Wireman will fill in here wattage of range elements as originally installed by him. | | RANGE AND WATER HEATER SERVICE | | No. 100 | |
| | | INSTALLATION --- REPAIR ORDER NO. | | | |
| Front R <i>1500</i> | Install— Repair —RANGE—Make <i>Hotpoint</i> | Type <i>11RA67</i> | Ser. No. <i>18494</i> | | |
| C | Install— Repair —WATERHEATER—Make <i>Edison</i> | Type <i>433 W7</i> | Ser. No. <i>V2041</i> | | |
| L <i>1000</i> | Watts <i>3000</i> Volts <i>220</i> | Man. Control <i>Ed 415 Y4</i> | Lagging <i>J. M. 2 p1y</i> | | |
| | At <i>Mrs. A.F. Smith,</i> | | | | |
| Rear R <i>440</i> | Address <i>1715 Fedora Ave., Fresno</i> | | | | |
| C | Trouble reported as: <i>Installation</i> | | | | |
| L <i>1000</i> | | | | | |
| Oven T <i>1500</i> | Take <i>Range, w.H and Jacket as per above</i> | | | | |
| B <i>1500</i> | | | | | |
| Broiler | | | | | |
| Water Heater data to be filled in by installing wireman | Special Instructions <i>Be careful of Kitchen walls and floor - Floortiling imported and hard to replace</i> | | | | |
| Boiler Size <i>24 g</i> | | | | | |
| Lagging <i>O.K.</i> | Order received by <i>Downing</i> | Date <i>9/10 1922</i> | <i>10</i> | A. M. — P. M. | |
| | Installation— Repair —made by <i>Petty</i> | Date <i>9/14 1922</i> | | | |
| | Charge to: Service | Manufacturer | Jobber | Customer | |
| | By Authority of <i>F.S.F.</i> | | | | |

Fig. 2—Combination installation and repair order blank. Note the special instructions to service men.

As this company is also in the electrical contracting business it installs the ranges that it sells to its customers. The information as to installation is also entered upon the individual record blanks. Records of the installation show who did the work and who inspected the job when completed. A space permitting a record of three years' operation and repair is provided on the card and reports on what repairs were needed, with all details and the costs of doing the work are entered as the conditions require.

Information, concerning the repairs necessary, is secured from card forms supplied to repairmen (Fig. 2). These forms are made out in duplicate and carry spaces for information regarding the work done by the man on the job. The amount of material used, with the cost of this material, the time consumed and any special remarks are entered by the repairman and a copy is sent to the range department for entering on the individual files.

Installation order blanks given to the workmen of the company are the same as the repair order blanks. Record blanks of the purchase of ranges and water heaters differ only in the color of the stock used. The former being printed on blue bristol board and the water heater records are kept upon yellow stock of the same grade of paper.

Personal contact between the company and its customers is made possible through the use of these record cards. When a man goes out on a job he makes his name known to the homeowner and is instructed to call the housewife by name. If, after installation, any other attention is required to keep the appliances in condition, the repair man who is sent out has previously seen the record card of the particular installation and has noted any former repairs, or special equipment notations.

On entering the house the repairman introduces himself and tells the housewife the name of the man who worked on the job the last time. As he has recently seen the record card he can talk intelligently concerning the installation and in this way shows the owner that the company has an interest in the work that has been done before. Men placing ranges and water heaters for the first time are advised of the condition of the house and are warned to be careful of certain fixtures or fittings.

This intimate knowledge with the job at hand impresses the homeowner with the care and attention that is given by the company to individual installations. This feeling among customers of the company has been found to be of inestimable value. A considerable amount of good-will has been secured and customers have been ready to recommend the service of the Valley Electrical Supply Company to other prospective customers.

One of the main reasons for keeping the range and water heater installation and record cards is the desire of the company to obtain accurate statistics on the service furnished by the different types and makes of these devices. The plan at present is to keep these record cards for a five-year period and then to make a comparison of the service

records of the different manufacturers' products.

These comparative charts will show how each separate unit held up under actual service conditions. Heating elements and all of the constituent parts will be compared with units of like size in other makes of ranges and water heaters.

This information will be taken from the record blanks which are kept in the files of the range and water heater departments. Consideration as to the length of time the appliance has been installed will be noted and allowance will be made for this.

The company feels that in this way, it can determine for itself the best brand of range and water heater and can then specialize on those makes. The test of the electric range is its operation, the company believes, and it plans to keep these records so that it may know the results of the test and can then be best fitted to serve its customers.

Merchandising Aid Offered by Manufacturing Company

Carrying out the policy of cooperating with the electrical dealer at every possible place, the Westinghouse Electric & Manufacturing Company's San Francisco office has adopted a rather original method of obtaining contact with the dealer. The publicity department of the organization has taken over the new work and is endeavoring to create greater merchandising efficiency in every store that handles the Westinghouse products.

Members of the department call upon the dealers, not as salesmen but as counselors to the men of the trade. These counselors aid in the decoration of show windows, give advice on advertising and accounting methods and on stock-keeping systems. They endeavor to help the dealer solve his own particular problems. No set of rules are followed by the publicity department representatives, as they feel that the individual problems of the dealer can best be solved by a close examination into the particular case. Thus a service is given to the dealer, which will provide greater sales for him and at the same time aid the manufacturer of the electrical equipment in placing its goods before the public in the best manner.

No charge is made for this service and it is given to any dealer who requests it from the company. It is the policy of the publicity department to call on the dealers, and before these calls are made, an introductory letter is written to inform the dealer of the intended call of the representative. This paves the way for the call and gives the dealer time to prepare any questions he may want to place before the manufacturer's representative.

In the letter which is sent to the dealer is inserted a printed card which provides space for him to indicate what sort of information he desires to receive from the manufacturer. Through this card the dealer can order supplies of folders, letters, advertising cuts, lantern slides, window display ideas, or catalogs. Space for requests for suggestions on bookkeeping systems, mail advertising ideas and newspaper advertisements are also provided. Prompt

attention is given these cards when returned to the publicity department.

The letter which is sent out to the dealer in advance of the call of the publicity department representative is

Date _____ 19__

Dear Mr. Scanlon:

We need the following supplies—

| 1 | Kind | Quantity | Appliance |
|---|----------------|----------|-----------|
| | Folder | | |
| | Letter | | |
| | Ad Cut | | |
| | Lantern Slides | | |
| | Window Display | | |
| | Catalogue | | |

Can you give us some suggestions on our—

| | |
|--------------------|------------------|
| Window Displays | Mail Advertising |
| Bookkeeping System | Newspaper Ads |

Remarks:

- ☐ Please send us "Contact."
☐ What other magazines should we read?
☐ How can we get your financial help on our newspaper advertising?

Name _____ Firm _____

Place _____

Note: Check ☒ items desired.

The return post card which accompanies each letter

called an "Idea Letter." The first one of these letters, which are in series form, is printed below.

Subject: I'M COMING TO SEE YOU

This isn't a sales letter nor an advertisement.

It is only

AN INTRODUCTION.

I do not want to have to explain who I am and why I came when I come to see you, so I am telling you here. It is good business sometimes to send ahead a little friendly letter to tell your business, because it saves the other fellow's time as well as your own. When you meet you don't have to stall around getting acquainted. That's done already—by the letter.

I'M COMING TO SEE YOU ABOUT WASHING YOUR WINDOWS—if they need it. Not that I think they do, but just to speak figuratively. I helped a man to put in a little window display a month ago and he hasn't taken it out yet! Maybe it was an attractive display, but that is no reason for not changing it, washing the window, dusting the floor, and putting in another more attractive trim.

Window displays are not the only things which get dusty and out of date after serving their time well in the store. Sales policies, ways of advertising, accounting systems, stock-keeping methods, and every detail of organization gets rusty or wears out gradually and needs continual renewing and improving.

The question is, "WHAT, HOW, and WHEN shall this renewing take place?" Here and there, one at a time, I hope to be able to give you answers to these questions through these IDEA LETTERS and through more personal letters and calls.

Within the Westinghouse organization, I am called a Promotion Representative but I trust that you will receive me as a working partner, not on your pay roll, but ready with my coat off to give you information and ideas and to help put those ideas to work for you. This is not charity. It is business. It means more business for us in the long run and it will mean more business for you almost as soon as you shake my hand.

If you really want to shake hands with me now and can't quite reach me, just sign the card and send it in.

I'm mighty glad to meet you, Sir!

M. W. SCANLON,
Publicity Representative.

INDUSTRIAL NEWS



Oregon Power Companies Plan to Have Interconnection

Negotiations are under way between the Portland Railway Light & Power Company and the Mountain States Power Company, for a connection between the two systems which will supply a means of interchange of electric energy, according to the announcement recently made by the latter company. Both companies operate considerable properties in the Willamette Valley—the Portland company including everything as far south as Salem and the Mountain States company supplying Albany, Springfield, Corvallis and vicinity to the south.

The two systems would be connected, according to the plans, by using the high tension lines of the Oregon Electric Railway Company between Albany and Salem, a distance of 25 miles. As the Mountain States Power Company is already connected with The California Oregon Power Company to the south, the new plan would mean a physical connection of power lines all the way from Portland, Ore., to San Diego, Calif.

Governing Body of Information Committee Is Enlarged

Increased activities for the coming year on the part of the Rocky Mountain Committee on Public Utility Information, which covers Colorado, New Mexico and Wyoming, necessitate a larger organization. As a result, the committee, at its annual election last week, added six central station men to its governing body.

The new members are C. N. Stannard, vice-president and general manager of the Denver Gas & Electric Light Company; Ernest Stenger, receiver for the Denver Tramway Company; George Bixler, department of publicity, Denver Gas & Electric Light Company; George Wehrle, superintendent gas department, Denver Gas & Electric Light Company; Paul Darrow, Greeley Gas & Fuel Company, Greeley, Colo.; W. A. Tobias, Otero County Gas Company, La Junta, Colo., and Ben S. Read, president, Mountain States Telephone & Telegraph Company, Denver, Colo.

Because of the splendid results attending the committee's work for the first year, it was unanimously decided to continue the organization indefinitely. A budget committee is now engaged in making a survey to determine ways and means of continuing activities on the enlarged scale contemplated in the plans formulated at the annual meeting.

W. C. Sterne, president of the Municipal Properties Company, which operates in several Colorado localities, was re-elected secretary-treasurer. E. A.

Phinney of the Jefferson County Power Company, Golden, Colo., was elected vice-chairman. George E. Lewis will continue in charge of the committee's headquarters in Denver, in the capacity of executive manager.

Mining Company Is to Increase Power Plant Capacity

The Granby Consolidated Mining, Smelting & Power Company is constructing an addition to its power plant at Anyox, British Columbia, and will install therein a 5,000-hp. vertical reaction turbine, designed by the Pelton Water Wheel Company, and which is to be built at the works of its associated company, the Dominion Engineering Works, Ltd., of Montreal.

The Granby company operates a copper mine and pyritic smelter at Anyox. The main power plant was constructed in 1913, and is situated on tidewater, the turbines discharging directly into Granby Bay.

A notable feature is the fact that normally all the requirements of both mine and smelter have been supplied by water power. Not only are the electric generators driven by Pelton impulse turbines, but other similar units, drive blowers, blowing-machines and compressors. The total installed water-wheel capacity is 8,400 hp. During the war, a steam standby plant was constructed and it is largely to eliminate the necessity for operating this plant that the extension of the hydroelectric plant is being made.

Water is obtained from Falls Creek, a diversion dam, which also provides a small amount of storage, having been constructed about a mile from the plant. To insure sufficient flow during the low-water period to provide for the increased requirements, an additional dam for storage alone has been constructed about two miles farther up-stream. The new turbine will operate under the same effective head as the present equipment, approximately 370 ft.

The Grays Harbor Northern Railroad, recently incorporated in Seattle with a capital stock of \$1,000,000, plans the construction of a railroad from Mo-clips north and northeast through the Olympic Peninsula forest reserve to connect with the government spruce railroad in the vicinity of Lake Pleasant, Clallam County. The line will be built to tap the great timber resources of that region. Incorporators of the company are John Cain, of Port Angeles; Oliver S. Morris of Hoquiam; F. W. Hastert of Aberdeen; J. W. Lawlor of Puyallup and S. A. Dice of Seattle.

Commission Will Try to Enforce Union Depot Erection

The California State Railroad Commission will apply to the Supreme Court for a rehearing in the Los Angeles terminal cases, in which the court held that the commission did not have jurisdiction to order the construction of a union passenger depot. In the event that the order of the Supreme Court becomes final the commission will initiate proceedings before the Interstate Commerce Commission looking to cooperative action to accomplish the result sought.

This announcement made by the commission follows the decision of the California Supreme Court annulling its order directing the Southern Pacific, the Santa Fe and the Salt Lake (Union Pacific) to join in the construction of a union depot as part of a plan for eliminating grade crossings and solving an acute traffic situation. The Supreme Court, while apparently conceding the power of the commission to order the elimination of grade crossings, held that the Interstate Commerce Commission under the Transportation Act of 1920 was given exclusive power over all extensions of railroad facilities including terminals. The court further held that the exercise of the state's power over grade crossings is not necessarily inconsistent with the concurrent exercise of the power of the Interstate Commerce Commission over terminal facilities.

In announcing its decision to apply to the Interstate Commerce Commission for cooperative action, the state commission decided to place at the disposal of the federal body the complete record in the case including the elaborate traffic studies prepared by its engineering department. This, the commission points out, is in accordance with the terms of the Transportation Act providing for cooperation between the federal and state commissions and will, it is believed, obviate duplication of preliminary work and hasten final decision.

New Idaho Power Plant Is Put in Operation at Mine

The new power plant of the Mascot Consolidated Mines Corporation, near Hailey, Idaho, has just been placed in operation. The plant includes a 250-hp. semi-Diesel oil-burning equipment which supplies power for the air drills, the machine shop and blower, as well as the modern electric lighting plant.

The Mascot company is arranging for the construction of a small testing mill, to be installed in February or March, preliminary to the building of a large mill that will care for the immense tonnage of ore now proved in the mine.

Equipment for First Oak Grove Unit Is Ordered

Portland Railway Light & Power Company Places Large Machinery Contract with General Electric Company

Orders were recently placed with the General Electric Company by the Portland Railway Light & Power Company for the electrical equipment for the first unit of the Oak Grove development on the Clackamas River, 57 miles from Portland. The orders covered one large water-wheel driven generator, with exciters, switchboard, three single-phase transmission transformers, high tension oil circuit oil breakers, etc. The ultimate capacity of the Oak Grove plant is three units of the size just ordered.

The generator will have the following rating: 30,000 kva. at 85 per cent power factor, 514 r.p.m., 11,000 volts, 3-phase, 60-cycle, vertical shaft, revolving field with direct connected 250-volt exciter mounted above the generator. All six generator terminals are to be brought out of the frame to permit the use of differentially connected overload relays. A vertical thrust bearing will be provided capable of carrying 100,000 lb. plus the weight of the generator rotor. Connection will be made to the 35,000-hp. Pelton reaction turbine by means of a solid flanged coupling.

In addition to the direct connected exciter, which will have capacity sufficient to excite one generator, a 200-kw. motor driven exciter, taking current from a special 3-phase, 11,000-2,300-volt transformer, is also provided. This motor driven exciter will be of sufficient capacity to furnish excitation for two 30,000-kva. alternators.

The order includes a 90-in. black marine finished switchboard with horizontal edgewise instruments, automatic voltage regulator, temperature indicator, switch controls, etc. Ample space will be provided for future installations.

The main transformers will be used to step up the generator voltage for transmitting to Portland. The three units are to be rated as follows: 10,000 kva., water cooled, outdoor type, 60-

cycle, single-phase with 11,000-volt low tension and 66,000-volt high tension windings. Three 5 per cent full capacity taps are to be provided in the high tension windings. It is planned to operate the transformers delta connected until the second Oak Grove unit is installed, at which time the transformers will be Y connected on the high side, making the transmission voltage approximately 115,000.

Each transformer will be equipped with oil conservator, copper cooling coils and the usual various thermometers, alarms, etc. Each unit will weigh complete when filled with oil 63,000 lb.

Commodity Prices Compared with Gas and Electric Rates

A chart which graphically presents the relation of the gas and electric rates to commodity prices and the cost of oil in California, has recently been prepared for the annual report of the Railroad Commission of the State of California by the Gas and Electric Division of the commission. The chart includes the years 1914-1922.

In its report the commission states that there has been a downward trend in the cost of several important classes of public utility service in the past fiscal year ended June 30, and that a corresponding reduction concurrently has been reflected by it in public utility rates. Regulation, the commission adds, has demonstrated its flexibility and responsiveness to general economic conditions.

Referring specifically to electric rates, the report points out that the maximum increase over 1914 levels was 35 per cent, and the present excess is approximately 16 per cent, while commodity prices soared to 173 per cent over normal at the 1920 peak and are still between 60 and 70 per cent above pre-war.

Gas rates showed a maximum increase of 27 per cent, which lasted about two months. Average gas rates are shown to be near normal.

Two power companies received particular attention from the investigating committee. These were the Pacific Gas & Electric Company and the Southern California Edison Company. In the case of the first company rates went to 134 per cent for one year, taking 1914 rates as 100 per cent, and the Southern California Edison Company rates figured on the same basis went as high as 143 per cent for a short period. Both of these rates were lowered by the commission within a year. The Pacific Gas & Electric Company rates are now 23 per cent above those in 1914 while the the rates of the Edison Company are 16 per cent over the 1914 schedule.

Will Erect Modern Wood Treating Plant in Oregon Town

A modern, up-to-date wood treating plant that will have an initial capacity of one carload per day is to be erected immediately in Springfield, Ore. The Carbolinum Wood Products Company of Portland is the concern and has purchased a site for the new plant on the Southern Pacific Tracks.

George P. Hitchcock, Eugene lumber dealer, is general manager of the concern and will maintain offices in the First National Bank Building in Eugene. The concern has owned and operated a similar plant at Alder, but this will be dismantled and brought to Springfield. Much new equipment will be installed.

Hood River Plant Will Be Ready to Operate by March

The Pacific Power & Light Company is rapidly bringing to completion its \$2,500,000 power plant on Hood River, in Oregon. The new power house will be outside the city limits, just below the grade of the new Mount Hood Loop highway. The dam is located three miles farther up the river and the 100-in. pipe line is being laid between the intake and the power house.

The new development will not only serve the rapidly growing communities around Hood River and The Dalles, Ore., and White Salmon, Wash., but the line will be tied with the Northwestern Electric Company's plant at White Salmon River, and energy will be sold from the local plant in Portland. The new plant will be ready for operation next March.

The Geysers Development Company has recently filed articles of incorporation with the county clerk of Sonoma County, Calif. This company plans to develop power from the geysers of Sonoma County. The company is organized for the purposes of mining for minerals, making gas, fuel, chemicals, electricity, and oils, and for maintaining hotels.

Small electric furnaces are being tested in the smelter camps in Colorado at the present time. According to men of the industry the success of the small or fifty-ton unit smelter depends upon the perfection of these furnaces. These small unit plants are designed for smelting ores of only one class.

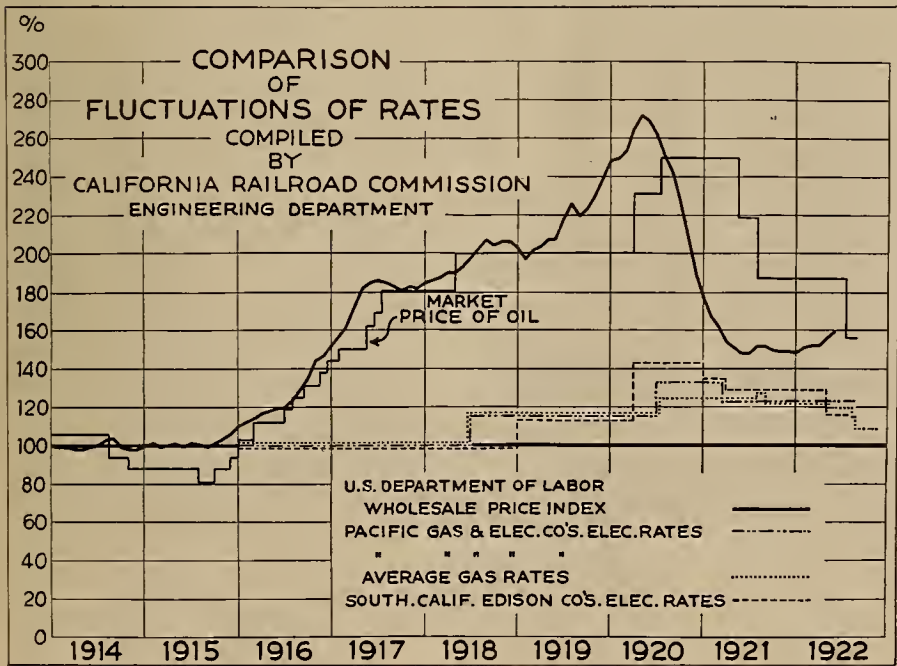


Chart showing comparison of commodity prices with gas and electric rates in California between 1914 and 1922, inclusive

New Washington Rate Schedule Has Been Filed

Active Room Principle Is Basis of New Electric Rates Presented for Ratification to Public Works Officials

A system of schedules entirely new in the State of Washington, but which promises to bring about a reduction in domestic lighting and cooking rates for electricity of from 20 to 30 per cent for about 95 per cent of the consumers, has been filed with the Department of Public Works by the Pacific Power & Light Company, which serves practically all of the communities in southeastern and central Washington.

The schedule is made up on a minimum charge basis, combined with a calculation of the number of active rooms a house contains. Active rooms are those customarily used, such as living room, dining room, kitchen and bedrooms. Halls, bathrooms, lavatories and porches, garages, barns and other such rooms are not considered active rooms, except that when a sleeping room is connected with the barn or garage, the two combined are listed as one active room.

Four different sets of schedules are contained in the tariff, providing lowest rates for the larger cities, and slightly higher rates as density of population decreases. All schedules are subject to 10 per cent discount. For Blalock, College Place, Yakima and Walla Walla, the new rates prescribed are 12.22 cents per kw-hr. for the first 9 kw-hr., plus 2 kw-hr. per active room, with a minimum of four active rooms. All in ex-

cess of this minimum, 6.66 cents per kw-hr. Minimums, inside corporate limits, \$1 per month; outside, \$1.50. The present rate is 12.22 cents for the first 30 kw-hr., and 10 cents per kw-hr. after that.

Class one towns are to have a new rate of 16.11 cents per kw-hr. for 7 hours plus 2 kw-hr. for each active room, minimum 4 active rooms; all in excess at 6.66 cents per kw-hr. The present rate is 16.11 cents for the first 30 kw-hr., and 10.55 cents per kw-hr. in excess of 30. Monthly minimum inside corporate limits, \$1, outside, \$1.50.

Class two towns will have the same rates as class one towns, except that the monthly minimum will be \$1.50.

The towns of Pomeroy and Toppenish receive still different rates. The new rates are 15.55 cents per kw-hr. for the first 7 kw-hr., plus 2 kw-hr. for each active room, minimum of four active rooms; all in excess at 6.66 cents per kw-hr. The old rates are 15.55 cents per kw-hr. for the first 30 kw-hr., and 10 cents per kw-hr. over that.

In addition to these rates, the company prescribes a combination lighting and cooking schedule for each class of town, and while this combined rate does not show as much reduction as the lighting rates, yet the whole schedule is worked out on the lower rates for greater consumption basis. In comput-

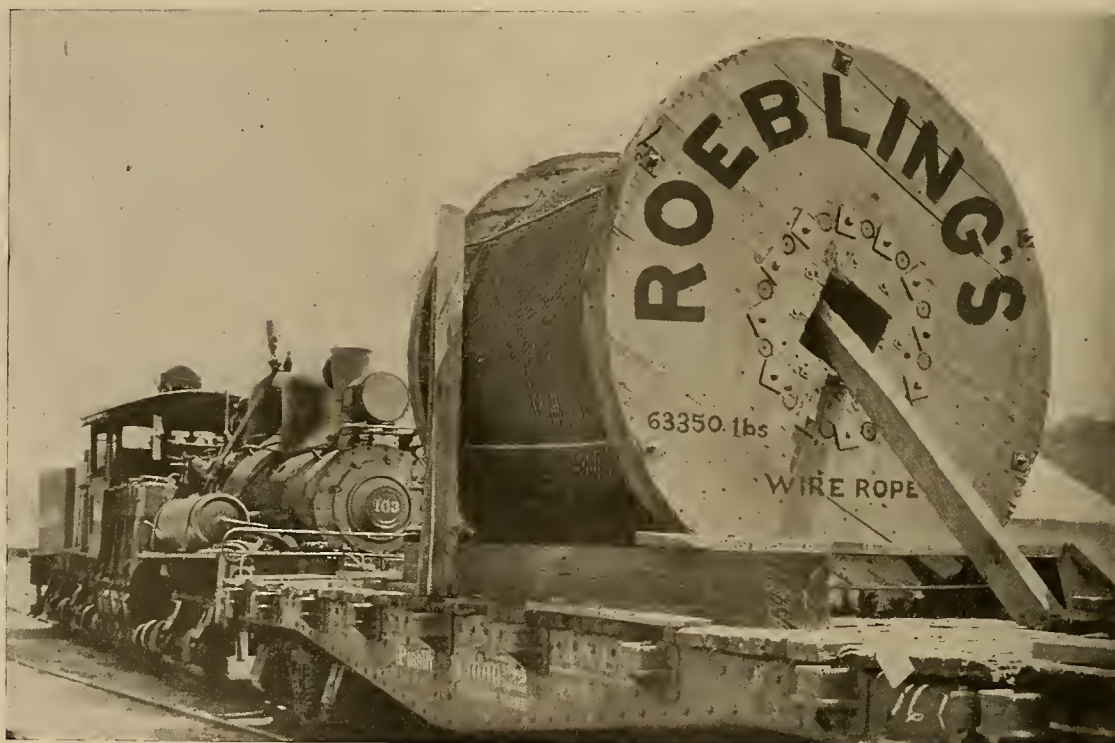
ing active rooms, as the rate basis, the schedules provide that each counted room up to and including six shall be considered as an active room. Each counted room in excess of six will be counted as one-half an active room, except in houses served under one contract and occupied by more than one independent family, in which case each counted room shall be considered as an active room.

The Department of Public Works has not yet approved the new schedules which will become effective Jan. 10. Information will be sought from other states, where the active room basis of computing rates is in effect.

According to reports from Twin Falls, Idaho, Jan. 16, has been finally set as the date on which residents of irrigation projects extending along the Snake River from St. Anthony to Twin Falls will vote on the creation of the proposed Snake River irrigation district.

The contemplated new district proposes to issue its bonds in payment to the federal reclamation service for obligations of the several canal companies included in the district.

The Arapahoe Light & Power Company located at Littleton, Colo., a suburb of Denver, has completed arrangements whereby it will provide power for a new machinery plant being constructed by the Stearns-Rogers Manufacturing Company near the Denver city limits. The contract calls for a supply of 1,500 hp.



During the construction work on the Big Creek No. 3 power house of the Southern California Edison Company, wire cable, having an approximate breaking strength of 180,000 lb., was needed for cars on the incline railroad. An order was placed with John A. Roebling's Sons Company of Trenton, N. J., and the reel pictured above was sent to the power company. The reel contained 15,000 ft. of plow steel wire rope which was in one piece, 1½ in. in diameter and composed of six strands, 19 wires to the strand, with an independent wire rope center. The net weight of the wire was 59,001 lb.

Commission Orders Consumers to Pay Standard Rates

Standard rates must apply to all electric railroads in the State of Utah, according to a decision recently handed down by the Public Utilities Commission of the state. A total of seventy-six contracts have been investigated by the commission and the ruling just handed down deals particularly with the Bamberger Electric Railroad Company.

This company had a special contract with the Utah Power & Light Company which stipulated that it should receive electric power at half rate. This special contract was made when the railroad company sold its filings on certain water rights on the Weber River, to the Utah Power & Light Company. The special rate was to hold for twenty-five years and now has fifteen years to run.

Under the ruling of the commission, the railroad company is to receive 5 per cent of the total cost of the plant erected on the Weber River site as a compensation for instigating the development. The actual purchase price of the site was \$525,000. Figuring the compensation as 5 per cent of this and adding filing fees and surveying costs, the commission has decided that the railroad is entitled to \$17,000 from the Utah Power & Light Company. Of this sum, \$2,000 is to be paid in cash and the balance is to be amortized over a period of fifteen years. During this period \$1,000 will be deducted each year from the railroad's payment to the power company.

Annual Kiddies' Day Is Held by San Francisco League

On Dec. 18, the San Francisco Electrical Development League held its annual Christmas Kiddies' Day Party. Ninety orphan children were delighted with the actions of Santa Claus and the clowns who presented balloons and Christmas gifts to them.

E. O. Shreve, San Francisco manager of the General Electric Company, acted as Kris Kringle and when bedecked with all of the appropriate beard and cos-

tume made a correct impersonation of the Christmas visitor. Presents for the children were purchased with funds collected as fines during the year.

About 500 members of the electrical industry in San Francisco were present at the meeting. Because of the large crowd it was necessary to use both the ball room and the concert room of the Palace Hotel to accomodate the luncheon guests.

Company Plans to Sell Holdings to Local Competitor

Denied authority by the Railroad Commission to extend its lines to additional territory, the Del Monte Light & Power Company has received from the California Railroad Commission permission to sell its holdings to the Coast Valleys Gas & Electric Company, which operates in territory contiguous to that served by the Del Monte company. The consideration is given as \$50,000, of which \$42,200 will be paid in bonds of the Coast Valleys company.

In a previous order issued by the commission in connection with the proposed service extension the commission stated:

The two companies operating as separate companies cannot possibly do as well as though the one company were supplying the entire territory, where these lines practically surround this particular company. Those points are outside the consideration of the company itself in its effort to build up and make money. They are the public considerations that confront this commission.

Murray City Corporation has applied to the state engineer of Utah for the use of 15 sec.-ft. of water from Little Cottonwood Creek, in Salt Lake County, Utah, to increase the output of the municipal plant which now serves Murray and vicinity. The new power plant site proposed is a short distance south-east of Sandy, Utah. Water will be brought to it from a point about 500 ft. upstream, a short distance in a flume, and the remainder of the way in a 30-in. pipe line. It will be turned over two 5-ft. Pelton wheels, under a head of 250 ft., developing an estimated 250 hp.

Utah Power Company Attacks Public Utilities Law

Declaring that the statute, which gives the Public Utilities Commission of the State of Utah power to determine the amount of reparation which a public utility shall pay a patron, whom it has overcharged, violates the fourteenth amendment to the Federal Constitution and at least two sections of the state constitution, the Utah Power & Light Company is violently attacking that section of the public utilities law which provides for this.

The power company claims that this statute gives a judicial function to a legislative or executive body and that it gives this body the right to confiscate private property without due process of law. According to the power company's claim, the amount of the reparation should be determined in the courts, thus permitting the utility an opportunity to fairly combat the suit for reparation.

The motion, which was placed before the commission, was brought about by the claim of the Utah-Idaho Central Railroad Company for reparation for over-payment to the power company during a period of over a year, by reason of a rate determined upon by the commission. Later the commission reduced the rate, making it retroactive and now the railroad company seeks to secure an indemnity for the over-payment.

The Chamber of Commerce of Fresno, Calif., is advocating the installation of a new system of electroliers for Commercial Park, in the valley city. This park is one of the most beautiful in the San Joaquin Valley and it is the purpose of the body to further enhance the site by installing a system of electroliers similar to those used in the downtown district. The standards in use at present are very expensive and highly inadequate, according to the manager of the Chamber of Commerce. The Southern Pacific Company has been asked to help pay for the new electroliers.



Santa Claus distributing presents to the ninety orphans at the annual Kiddies' Day Party of the San Francisco Electrical Development League.

Permit Sought for Utah Power Development Project

Development of 4,800 hp. of electrical energy on Big Cottonwood Creek is proposed under an application filed with the Utah state engineer by Clarence Snow of Salt Lake City.

The application seeks to divert 50 sec.-ft. of water from the Big Cottonwood Creek at a point in section 14 of township 2 south, range 2 east. The diverting works are to consist of a concrete diversion dam and headgate and pipe line. It is proposed to convert this water by means of a diversion ditch some 17,400 ft. to the power plant, where it will be used under a head of 1,140 ft. to operate a number of reaction-type turbines. The water is to be returned to the river channel at a point about six miles below the point where taken out.

Major Blauvet Named Colorado State Highway Engineer

After passing the civil service commission examination at the head of the list, Major L. D. Blauvet has been appointed state highway engineer for Colorado by Governor Shoup. Major Blauvet has been holding the position temporarily, as at the time of the adoption of the new Colorado highway law no one had passed the required examinations. His recent passing of the examinations makes him fully qualified for the position.

At the present time Major Blauvet and the seven members of the state highway commission are working on the 1923 budget of the highway commission. Indications are that the new budget will be close to \$9,000,000.

Power Company to Increase Its Generating Capacity

The Coast Power Company of Tillamook, Ore., which serves the city and vicinity, has closed down its steam plant for a period of three months, pending the completion of a new and larger plant located on Hoqwarton Slough. During the construction period, energy will be supplied the power company by the Whitney Lumber Company of Garibaldi, Ore.

The capacity of the present plant of the Coast Power Company was 800 kw. This equipment will be moved to the new location and another turbo-generator of 1,500 kw. added, together with boilers and auxiliaries. Arrangements have been made with the Whitney Company to purchase their excess power for distribution throughout the country.

Service to Be Given California Towns by Power Line

The Midland Counties Public Service Corporation of San Luis Obispo, Calif., has recently completed the construction of a 30-mile high tension transmission line at a cost of \$100,000. The new line will serve the towns of Morro, Cayucas and Cambria, and a number of smaller adjacent communities.

The line connects with the 60,000-volt line of the company at a point near the San Luis Obispo Polytechnic School and from this point to Cayucas, a distance of 20 miles, is for 60,000-volt operation. From Cayucas to Cambria the line is

designed for 10,000-volt current. The entire new system will be operated at 10,000 volts as the load does not justify higher voltage at present.

Contracts have been signed for about forty pumping plants, to be installed next spring, ranging in capacity from 15 to 50 hp. One hundred and forty meters for lights and power have been set since the completion of the line and the company expects that the number will be more than doubled during the year.

Portland to Have New Cooperage Plant in Near Future

A new cooperage plant to be known as the Pacific Hoop Company, to utilize Oregon woods, is to be established immediately on a ten-acre tract in the Peninsula district of Portland, Ore. The site purchased already has on it a large corrugated iron building, which will be used, and other buildings will be added to house the wood working machinery, a sawmill of 20,000-ft. daily capacity and the dry kilns.

The new company is an Oregon corporation capitalized at \$50,000. The officers are G. P. Clerin, president; J. E. Wright, vice-president, and V. J. Marchand, secretary, all of whom are experienced in the cooperage business.

New Mexico Town Will Have New Generating Plant Soon

Artesia, N. M., is to have \$50,000 worth of new electrical equipment installed in the power plant of the city. A new steam generating plant will be installed on the site of the old Pecos Valley Gas & Electric Company's plant.

The old plant has been purchased by the city and has been operated temporarily by the city. Under conditions existing at present the power plant can generate electricity for lighting purposes only. When the new equipment is installed there will be a supply of power sufficient to operate many commercial motors in the town.

Application for a license by the Home Builder Mining and Development Company has been filed with the Federal Power Commission for the development of a power project in the Coeur d'Alene National Forest, Kootenai County, Idaho. This involves the construction of a diversion dam 50 ft. and another 40 ft. high in Phantom and Blue Grouse Creeks, with two miles of pipe line to the power house on Wolfe Lodge Creek, developing 250 hp. for mining purposes.

Construction of the power line from Sheridan, Mont., to Dillon, Mont., will be started in the late spring months. This transmission line will bring the power of the Montana Power Company to the Union Electric Company at Dillon. Actual construction will probably take a greater part of the summer.

Cities near Anchorage, Alaska, will be supplied with electricity from a power plant capable of generating 3,000 hp., according to advices received by the Seattle Chamber of Commerce from J. C. Dort, assistant engineer of the forest service. It is thought that three generators will carry power over a 55-mile transmission cable.

Books and Bulletins

ELEMENTS OF APPLIED ELECTRICITY

By H. H. BLISS, Director of Vocational Education, Riverside, Calif. 6 by 9 in. 403 pages. 102 diagrams and illustrations. \$2. Published by Journal of Electricity and Western Industry, San Francisco.

The best investment of spare time is in study leading to self-improvement and to advancement in one's vocation. Electrical workers enjoy exceptional opportunities of this kind. This book, which first appeared in the Journal of Electricity and Western Industry in the form of a study course, has been written for use as a text book for those men desirous of having an understanding of the fundamentals of electricity and electrical machinery. The author has been thorough in his treatment of the subject, yet in no place is his language so technical that it cannot be understood by one almost totally unfamiliar with the subject of electricity. Similarly, the mathematical solutions of the problems offered are most simple and a knowledge of common arithmetic is sufficient for solving any of the problems which are used to supplement the text and to give the student a more thorough understanding of the theories discussed. The text goes into detail concerning circuit and machine characteristics, efficiencies, applications of principles and electrical calculations.

PENDER HANDBOOK FOR ELECTRICAL ENGINEERS

By HAROLD PENDER, editor-in-chief, director electrical engineering department, University of Pennsylvania, and WILLIAM A. DEL MAR, associate editor-in-chief, Chief Engineer, Habirshaw Electric Cable Company. Second edition. 4½ by 7 in. 2,270 pages, flexible leather binding. Fully illustrated with charts, drawings, diagrams and tables. \$6. John Wiley & Sons, Inc., New York.

This is a revision of the first edition of Pendar published in 1914. It has been completely revised and much new material added. Included in the new articles is one on the electric propulsion of ships and one on electric welding. Because of the considerable progress electrical science has made in the advancement of the electron theory and its application to engineering, full treatment has been given this subject. The work constitutes a valuable reference book for practicing engineers and students of engineering. In addition to the usual index, an encyclopedic arrangement of the material in the front of the book especially commends it for reference purposes. By following the topical list of articles no difficulty should attend its use for constructive study. To make the book adaptable for the use of engineering students in the universities this list has been arranged in the order usually followed in the course of class studies. The authors have taken special care to make each article a readable compendium on its subject rather than merely a series of disconnected paragraphs containing miscellaneous data, a too common fault in hand books.

W. C. H.

Meetings

Sacramento Electrical Men Form New Cooperative League

At a banquet given in the Hotel Land at Sacramento, Calif., on Dec. 13, almost a hundred members of the electrical industry of Sacramento and vicinity met with a large delegation from the San Francisco Electrical Development League for the purpose of discussing the advisability of forming a permanent electrical club in the Sacramento district. J. C. Hobrecht acted as toastmaster of the meeting, introducing in turn E. O. Shreve, manager of the San Francisco office of the General Electric Company; R. A. Balzari, president of the San Francisco Electrical Development League; Don C. Ray, Pacific Gas & Electric Company; and Geo. B. Sanford, Great Western Power Company, who expressed sentiments in favor of the proposed organization.

After several speeches from the floor wherein all expressed sentiments in favor of an organization uniting the various electrical interests for mutual benefit, the following resolution was proposed by J. A. Woods:

"Whereas, There are, in Sacramento and surrounding territory, a considerable number of men engaged in the electrical industry in managerial, engineering, or other responsible capacity, and

"Whereas, An organization is deemed advisable for the purpose of drawing these men closer together for purposes social, educational and commercial, therefore be it

"Resolved, That an organization be formed, and for the speedy accomplishment of this object, be it

Further Resolved, That the chairman of this meeting appoint a committee of fifteen, which committee shall organize at an early date and shall appoint from its number such sub-committees as may be deemed necessary for the speedy conduct of business, and shall prepare a form of constitution and by-laws, a list of nominees for office, and such recommendations and reports as it may deem advisable for the organization of a permanent society and shall report its recommendations for action by this body at another meeting to be held in the near future."

The above resolution was voted upon by those assembled and adopted. J. C. Hobrecht, acting as chairman, appointed the following committee:

J. O. Tobey, chairman, P. G. & E. Co.
Jay A. Davis, G. W. P. Co., Sacramento.
Fred Bennett, Telegraph
E. H. Long, Telephone
H. A. Shearer, Telephone
A. P. Braughten, S. P. Co.
W. H. Evans, S. N. R.R.
G. M. Simonson, State of Calif.
L. J. Fletcher, Univ. of Calif., Davis Farm
Carl Lamus, Automotive Electrician
A. C. Scott, Retail Stores
R. B. Brewster, Radio
C. Prudhomme, Electrical Contractors
James A. Woods, Elect. Contr.-Dealers.

The appointment of this committee was followed by showing of a motion

picture, "The Electrical Home," starring Buster Keaton.

J. O. Tobey, chairman of committee, called a meeting for Dec. 18, at which time Jay A. Davis, having acted as secretary to the original committee, was continued in that capacity to the committee of fifteen and also temporarily elected treasurer. The general plan of the work having been made known at the dinner meeting, Mr. Tobey appointed the following committees for purposes expressed in the resolution adopted:

Name Committee (This committee to receive suggestions for a suitable name for the organization and make report to full committee):

F. A. Bennett, West. Union Tel. Co., Sacramento, chairman.
W. H. Evans, S. N. R.R., Sacramento.
C. Prudhomme, Elect. Contractor, Sacramento.

Committee on By-laws (This committee to frame a complete set of by-laws patterned, insofar as practicable, after those of similar and successful organizations):

James A. Woods, Cal. Mech. & Elect. Eng. Co., Sacramento, chairman.
L. J. Fletcher, Univ. of Calif., Davis Farm.
H. A. Shearer, T. P. T. & T. Co., Sacramento.

Committee on Nomination (This committee to select from available members a set of nominees for the principal offices—to be selected in duplicate, if possible and wherever practicable, in triplicate):

G. M. Simonson, Dept. of Pub. Wks., State of Calif., chairman.
C. W. Beaton, City Electrician, City of Sacramento.
Jay A. Davis, G. W. P. Co., Sacramento.
R. B. Brewster, J. C. Hobrecht, Sacramento.
Carl Lamus, Automotive Electricians, Sacramento.

Committee on Arrangements (This committee to make all necessary arrangements for next general meeting to perfect the organization):

C. Prudhomme, Electrical Contractor, Sacramento, chairman.
Ben Brown, T. P. T. & T. Co., Sacramento.
J. J. Scott, John Bruner Co., Sacramento.

Following is a list of names of each attendant at the dinner of Dec. 13, who indicated his intention of becoming a member of the new organization:

C. L. Anderson, Anderson Miller Elect. Co., Sacramento.
R. A. Balzari, West. Elec. & Mfg. Co., San Francisco.
C. W. Beaton, City Electrician, Sacramento.
A. P. Braughton, Elect. Dept., S. P. Co., Sacramento.
Ben Brown, T. P. T. & T. Co., Sacramento.
L. D. Burlingame, P. G. & E. Co., Sacramento.
R. L. Bushey, G. W. P. Co., Sacramento.
W. E. Camp, Roberts Eng. & Const. Co., Sacramento and Marysville.
M. P. Canon, Latourette Fical Co., Sacramento.
C. H. Carter, C. H. Carter Co., Sacramento.
Chas. H. Claytor, P. G. & E. Co., Sacramento.

COMING EVENTS

National Council of Lighting Fixture Manufacturers—

Annual Convention—Cleveland, Ohio
Jan. 15-20, 1923

Lighting Fixture Dealers Society of America—

Annual Convention—Cleveland, Ohio
Jan. 15-20, 1923

American Institute of Electrical Engineers—

Midwinter Convention—New York, N. Y.
Feb. 14-16, 1923

E. Conger, Conger's Elect. Shop, Woodland.
Edward T. Cook, Sterling Elect. Co., Sacramento.

J. W. Coons, P. G. & E. Co., Woodland.
H. M. Cooper, P. G. & E. Co., Auburn.
W. Rad Coover, P. G. & E. Co., Sacramento
J. W. Crabbe, P. G. & E. Co., Auburn.
C. B. Daniel, P. G. & E. Co., Sacramento.
W. J. Delehanty, G. E. Company, Sacramento.
Jay A. Davis, G. W. P. Co., Sacramento.
R. E. Dryer, West. Elec. Co., Sacramento.
W. H. Evans, S. N. R.R., Sacramento.
L. J. Fletcher, Univ. of Calif., Davis Farm, Davis.

E. W. Florence, P. G. & E. Co., Sacramento.
Geo. C. Foss, Electrical Contractor, Sacramento.

J. G. Frye, P. G. & E. Co., Sacramento.
Jason L. Frye, P. G. & E. Co., Sacramento.
O. S. Furt, Dealer, Davis.

S. E. Gamble, Westinghouse E. & Mfg. Co., Sacramento.

T. J. Goldbeck, Electrical Supply Co., Sacramento.

D. L. Hickey, P. G. & E. Co., Sacramento.

Earl M. Hart, P. G. & E. Co., Sacramento.

J. C. Hobrecht, J. C. Hobrecht Co., Sacramento.

P. J. Hobrecht, J. C. Hobrecht Co., Sacramento.

R. Jones, C. Prudhomme, Elect. Contr., Sacramento.

James R. Kelly, G. W. P. Co., Brighton.

R. E. Knight, G. W. P. Co., Brighton.

W. E. LaBare, T. P. T. & T. Co., Sacramento.

J. Fred LaPlace, Thos. Day Co., Sacramento.

Geo. W. Lee, W. S. G. & E. Co., Florin.

H. B. Matthews, P. G. & E. Co., Sacramento.

D. H. McCullough, Contractor-Dealer, Sacramento.

Ben D. Moses, Univ. of Calif., Davis Farm, Davis.

J. O. Murphy, Contractor-Dealer, North Sacramento.

D. R. Murray, G. W. P. Co., Sacramento.

A. H. Nicoll, West. Electric Co., San Francisco.

Leo J. O'Brien, P. G. & E. Co., Sacramento.

Clifford Prudhomme, Elect. Contractor, Sacramento.

Jas. S. Remick, Jas. S. Remick Co., Sacramento.

W. H. Rockingham, Dept. of Pub. Wks., State of Calif.

A. E. Rowe, Garnett Young & Co., San Francisco.

C. A. Rylander, Elect. Ry. & Mfg. Supply Co., San Francisco.

Geo. B. Sanford, G. W. P. Co., Sacramento.

V. H. Savoie, Elect. Machinery Co., Sacramento.

Tom Scott, Sr., Scott, Lyman & Stack, Sacramento.

C. E. Sedgwick, P. G. & E. Co., Dixon.

G. M. Simonson, Dept. of Pub. Wks., State of Calif.

C. V. Schneider, Elect. Supply Co., Sacramento.

H. A. Shearer, T. P. T. & T. Co., Sacramento.

W. D. Tomas, Electric Appliance Co., San Francisco.

J. O. Tobey, P. G. & E. Co., Sacramento.

L. T. Weber, City of Sacramento (Electrical Dept.).

W. A. Weight, Sterling Elect. Co., Sacramento.

H. E. Willis, S. F. S. R.R., Sacramento.

F. W. Nieuman, White & Nieuman, Davis.

James A. Woods, Cal. Mech. & Elect. Engr. Co., Sacramento.

In attendance at the meeting of Dec. 13, from the San Francisco Electrical Development League, were the following:

M. W. Scanlon, A. H. Nicoll, V. W. Hartley, W. F. Price, A. E. Rowe, S. P. Russell, L. F. Leuney, R. A. Balzari, E. O. Shreve, G. H. Curtiss, J. E. Bridges, W. L. Winter, R. S. Prussia, S. E. Gamble, D. C. Ray, R. F. McDonald, N. S. Gallison, W. W. Hicks, A. J. Kercher, Paul White, A. Strauch, R. B. Peterson, W. D. Thomas.

Colorado River Development Is Discussed by Engineer

Captain Clarence S. Jarvis of the United States army engineering corps was the speaker at the weekly luncheon of the Rotary Club of Provo, Utah, on Dec. 8.

Captain Jarvis spoke on the engineering features of the Colorado River project. He related, in brief, the story of the signing of the pact that has now gone before the legislative bodies of the states and the nation, providing for the diversion of the flow of the river at Lee's ferry.

Personals

Dr. Robert A. Millikan of Pasadena, Calif., has been awarded the Edison Medal for 1922 by the American Institute of Electrical Engineers for "his experimental work in electrical science." The Edison Medal was founded by the Edison Medal Association, composed of associates and friends of Thomas A. Edison, and is awarded annually by a committee consisting of twenty-four



DR. ROBERT A. MILLIKAN

members of the American Institute of Electrical Engineers for "meritorious achievement in electrical science, electrical engineering, or the electrical arts." Dr. Millikan was born in Morrison, Ill., in 1868, is a graduate of Oberlin, class of 1891, and was granted a Ph.D. from Columbia in 1895. He also holds degrees from Berlin and Göttingen, Northwestern, Pennsylvania and Amherst. He took up the teaching of physics at Oberlin in 1891 and from there went to the University of Chicago where he became assistant professor of physics in 1901, associate professor in 1907 and professor in 1910. In 1921 he became director of the Norman Bridge Laboratory of Physics at the California Institute of Technology where he is also Chairman of the Administrative Council. Dr. Millikan is the author of numerous books on physics and has contributed largely to the technical press on the same subject. He is a member of the National Academy of Sciences, American Philosophical Society, American Physical Society, the American Institute of Electrical Engineers; also the Cosmos, Quadrangle, University and Valley Hunt clubs.

Jesse S. Wathey, superintendent of the Butte Electric Railway Company, Butte, Mont., has retired and in the future will make California his home. Mr. Wathey has been connected with the company for the past 33 years. His post will be taken by E. J. Nash, former electrical superintendent of the company.

Dr. Henry Landes, professor of geology and mineralogy and deal of the college of science at the University of Washington, recently reviewed the results of a survey which he conducted

on the geological formations of the Pacific Northwest, before the Seattle section of the American Institute of Electrical Engineers. He discussed the survey from the standpoint of the influence of geological formation on the hydroelectric possibilities of that section of the country.

Franklin T. Griffith, president of the Portland Railway, Light & Power Company, has returned to Portland after an eastern business trip. Mr. Griffith, who is a vice-president of the National Electric Light Association, attended the meeting of the executive committee of that organization while in New York.

J. C. Thompson, formerly assistant treasurer of The California Oregon Power Company, has been made assistant general agent with headquarters in Medford.

Dr. Edgar A. Loew, associate professor of electrical engineering at the University of Washington, Seattle, was the chief speaker at a recent meeting of the Seattle section of the American Institute of Electrical Engineers. Professor Loew discussed the results of exhaustive studies on electric heating which have just been completed by the Engineering Experiment Station of the university.

F. W. Buck of the Hoover Sweeper Company, Indianapolis, recently spent several days in San Francisco. Mr. Buck is investigating market conditions in the various western business centers.

E. D. King, of the Washington Coast Utilities Company of Arlington, Wash., is a recent San Francisco visitor.

V. L. Board has been named general superintendent of the Denver Gas & Electric Light Company. He formerly served as assistant to the general manager, C. N. Stannard, and his new office is the one formerly held by T. O. Kennedy, now general manager of the Ohio Public Service Company, with headquarters in Cleveland.

Chas. H. Lee, consulting engineer of San Francisco, formerly chairman of the California Water Commission, has been appointed by the Board of Regents of the University of California as lecturer in civil engineering during the coming year and will conduct the course in Water Supply Engineering ordinarily given by Professor Chas. Gilman Hyde, professor of Sanitary Engineering. Professor Hyde will be absent from the university during the coming half of 1923 on sabbatical leave. Mr. Lee will carry on the work at the university in addition to his regular consulting practice.

John R. Freeman, president of the American Society of Civil Engineers, is again in his New York headquarters after visiting the Pit River development of the Pacific Gas & Electric Company, the Caribou plant of the Great Western Power Company, the Hetch Hetchy, Lake Eleanor dam, the experimental research laboratories of Dr. Millikan and Dr. Noyes at Pasadena, the Imperial Valley protection work from the incursions of the Colorado River at Yuma, and other interesting western developments.

D. C. McClure, electrical superintendent of the Denver Gas & Electric Light Company, attended the Yale-Harvard football game in New Haven, Conn., Nov. 25, while on a business trip to New York.

H. M. Southgate, manager of the Washington, D. C., office of the Westinghouse Electric & Manufacturing Company, is spending several weeks in Los Angeles.

Major John C. Gothwals of Juneau, Alaska, chief engineer of the Alaskan Railroad Commission, was recently the guest and speaker at a luncheon of the A.A.E., Seattle branch.

Milton Henoch has just been assigned to the Los Angeles office of the Westinghouse Electric & Manufacturing Company, as range and heating appliance specialist. Mr. Henoch has been with the Westinghouse company for the past fourteen years and prior to his recent assignment, was central sales representative of the Mansfield Works of that company.

Lee M. Oakford, of the Graham-Reynolds Electric Company, Los Angeles, has just recently been appointed manager of the lamp department of that company. Mr. Oakford has been in the sales department of the Graham-Reynolds Electric Company for the past year and a half, and prior to that time, was with the sales department of the Westinghouse Lamp Company's Los Angeles office.

B. E. Rowley, sales manager, Salt Lake district, Edison Electric Appliance Company, attended the Pacific Coast Jobbers' Association convention at Colorado.

William E. Sweet, well known to the electrical industry in Colorado, was recently elected governor of that state on the Democratic ticket in one of the closest campaigns ever waged in that section. Although nominally a banker and financier he has prominent connections in the electrical industry in Colorado and surrounding states. He is vice-president of The Albert Sechrist Manufacturing Company, manufacturers of lighting fixtures and electric cookers, and is financially interested in an electric utility in Nebraska and has extensive holdings in Colorado industrial organizations. One of the prominent



WILLIAM E. SWEET

planks in the platform of the governor-elect was one favoring municipal ownership of public utilities. It is believed that this constituted one of the reasons for the defeat of certain measures referred to the voters at the recent election giving the state utilities commission power of control over all public utilities in "home rule" cities, excepting those municipally owned.

Robert Sibley, Pacific Coast editorial director of the McGraw-Hill electrical papers, *Electrical World*, *Electrical Merchandising* and *Journal of Electricity and Western Industry*, has resigned to become executive manager of the University of California Alumni Association, remaining only as a consulting editor for these papers. The University of California, with its ten thousand regularly enrolled students at Berkeley, its thirty-five hundred students at the Southern Branch in Los Angeles, and its annual budget expenditure of eight million dollars, has become an impor-

engineering from the University of California with the class of 1903. He was for four years professor of electrical engineering at the University of Montana, for four years professor of mechanical engineering at the University of California, and has had extensive experience in hydroelectric practice. He became editor of the *Journal of Electricity and Western Industry* in 1916 and held that position until July, 1922, when he was made editorial director of all of the McGraw-Hill electrical papers for the Pacific Coast. Mr. Sibley is vice-president of the American Institute

Dr. Elwood Mead, chief of the land settlement division of the California State Department of Public Works, has announced that he will not be a candidate for reappointment to that post next year. Dr. Mead, who is a pioneer in land settlement work, having organized the present Durham colony in California six years ago, is also professor of rural institutions at the University of California.

W. A. Ramsay, general manager of Catton Neill & Company, Ltd., consulting and contracting sugar mill engineers of Honolulu, Hawaii, was a recent San Francisco visitor. Mr. Ramsay is making an intensive study of the industrial conditions of certain sections of the United States and will return to the Hawaiian Islands some time in the middle of January. Men of the West will recall that John Hood, formerly of the General Electric Company San Francisco office, is now in the employ of Mr. Ramsay in Honolulu.

Harry L. Harper, manager Los Angeles office, Western Electric Company, recently spent ten days in Portland and northern points where he attended a conference of Western Electric Company managers.

C. D. LaMoree, of the firm of Clapp & LaMoree, has just returned to Los Angeles from a very extended trip East where he visited the numerous factories which his firm represents on the Pacific Coast. Mr. LaMoree visited New York, Chicago, Valparaiso, Ind., Providence, R. I., and Racine, Wis.

Dr. Lloyd N. Robinson, recently chief electrical engineer for the Merced Irrigation District at Merced, Calif., is now electrical engineer for Stone & Webster, Inc., at Seattle, Wash.

George E. Quinan, chief electrical engineer, Puget Sound Power & Light Company, is deserving of much of the credit for the annuity idea which has been worked out for the extension of rural service lines in the State of Washington. The Department of Public Works of Washington, after a most exhaustive study of the rules and principles involved, has practically adopted them as a part of the regulatory law of that state.

H. W. Bliven, vice-president of Harvey Hubbell Company of Bridgeport, Conn., is a recent Pacific Coast visitor.

S. W. Bishop, executive manager of the Electrical Cooperative League in Denver, is a member of the committee staging the annual American Leagion show in that city.

A. J. Francis of the Fort Wayne Works of the General Electric Company, Fort Wayne, Ind., manager of fractional horsepower sales, is a recent San Francisco visitor.

J. R. Tomlinson of Portland, Ore., and Clyde L. Chamblin of San Francisco, are candidates for national executive committeemen from the Pacific Coast Division in the forthcoming elections of the National Association of Electra-gists.

H. J. Bilica, district line material manager of the Western Electric Company of San Francisco, is in Los Angeles going over the field with the local representatives.

Carl O. Martin of the Benjamin Electric Manufacturing Company, formerly located in Seattle, is now located in San Francisco as assistant to Miles F. Steel, Pacific Coast manager.



ROBERT SIBLEY

tant force in the development of the West. Mr. Sibley's work will be largely among the twenty-five thousand alumni and former students of the University. An effort will be made to bring about a better understanding of the University among business and professional men, and to promote a healthier relationship between the great educational institutions of the West and the factors concerned with its upbuilding. The enthusiasm and substantial financial support that has been pledged to this new and enlarged activity by hundreds of men and women throughout the West augur success from the start for this unique undertaking, perhaps the first of its kind among American universities. Mr. Sibley is a graduate in electrical

of Electrical Engineers and of the American Society of Mechanical Engineers, and last May in recognition of his work in hydroelectric and steam-electric advance he was granted the Doctorate Degree of Electrical Engineer by the University of California. He is co-author with C. H. Delany of "Elements of Fuel Oil and Steam Engineering."

W. D. Barkhuff, Seattle civil engineer, has been appointed superintendent of streets and sewers, to replace Colonel George M. Rice, who resigned before he had taken over the work. Mr. Barkhuff served as district engineer in the city engineer's office from 1908 to 1911, since which time he has been engaged in contracting work in Seattle.

Manufacturer, Dealer and Jobber Activities

The Benjamin Electric Manufacturing Company, Chicago, has lately announced its line of plural socket devices. The group includes the No. 122 two-way plug, the No. 77 swivelling two-way plug, the No. 1080 tap plug and the No. 1006 adapter. The first described plug is a new edition of the original two-way plug manufactured by the company.

The Brascolite Company, of St. Louis, Mo., has recently appointed A. S. Knight of Seattle as its manufacturer's agent in that city. Mr. Knight has been given Montana, Washington, Oregon and northern California as his territory.

The Roller-Smith Company, New York City, has published Bulletin No. 20, which describes the Universal radio telephone receivers and loud speakers manufactured by the company. The loud speaker is a new product of the company.

The Western Electric Company of Denver has added to its local staff of experts, M. K. Leonard, who will specialize in farm light and power, telephone, battery and radio business of the company.

C. F. Bulotti Machinery Company has moved into its new store room at 67-71 Main Street, San Francisco. The new location is in the heart of the machine tool district and gives ample room for display as well as office facilities and immediate shop repair work.

The Simplex Wire & Cable Company, of Boston, has opened a branch office in New York City. Joseph G. Brobeck has been appointed manager of the New York branch.

The Hart & Hegeman Manufacturing Company, of Hartford, Conn., has recently placed on the market a new fuse plug which is known as the H & H fuse plug. This plug has a removable core thus permitting a renewal of the fuse by merely changing the core.

The Trinidad Gas & Electric Supply Company has opened the first radio broadcasting station in southern Colorado. Arrangements have been made by Harold Reed, general manager, to provide programs at least three nights a week which will be received in the various coal camps of the Colorado Fuel & Iron Company, through arrangements recently made for the installation of receiving sets and amplifiers in the company club houses. The first program was sent out Nov. 27.

The Dublier Condenser & Radio Corporation, of New York City, has recently put on the market a new line of Dublier Micadon condensers. Three separate styles of these devices are now marketed by the company in addition to its Dublier Variadon variable condensers.

The Westinghouse Electric & Manufacturing Company has recently extended its type F-11 line of oil circuit breakers by the addition of breakers of larger capacity, known as type F-22. The F-11 and the F-22 oil circuit breakers together comprise a line of moderate capacity, non-automatic and automatic, manually-operated breakers for

indoor service. The type F-11 breakers are two and three-pole, single and double throw and are made in the panel-mounting and remote control, wall and pipe mounting forms for 200-amp., 4,500-volt service and 400-amp., 2,500-volt service. The type F-22 breakers are made in the panel mounting and remote control, wall and pipe mounting forms for 400- and 600-amp., 7,500-volt service, and 800-amp., 2,500-volt service, and are one, two, three and four pole, single throw, manually operated.

Betts & Betts Corporation, of New York City, has recently published its Radio Bulletin No. 180. This describes the Betts visible detector-amplifier, Betts head sets and the Betts loud speaker. The company's line of variometers, audio frequency transformers and vacuum tube sockets are also described.

The F. W. Wakefield Brass Co., Vermilion, Ohio, has recently issued a descriptive folder on their Red Spot commercial hangers. This folder describes their suspension and ceiling types of hangers and accessory units, also the method of packing.

E. E. Stettler of the West Denver Electric Company provided radio concerts for the crowds attending the Santa Fe Drive celebration in Denver recently. Loud speaking apparatus and amplifying equipment was provided by A. C. Cornell of the Western Electric Company, Inc.

George M. Woods, of American Falls, Idaho, has announced his intention of opening an electric shop in that city. Mr. Woods is an experienced electrician.

The O. C. White Company, of Worcester, Mass., has recently published its booklet on White adjustable electric light fixtures. The booklet contains illustrations and descriptions of all of the portable and mounted fixtures manufactured by the company. A new price list is included.

Additional representation for the Eden washing machine in Denver, Colo., has been given to George A. Hunt of that city and he has established headquarters at 505 Commonwealth Building, according to advertising recently appearing in the Denver papers.

C. Brandes, Inc., has recently produced a new method of displaying radio headphones. The company has prepared for distribution to dealers and jobbers bronze statuettes upon which headsets can be adjusted. The device has proved to be quite popular among retail radio merchants.

The P. A. Geier Company, Cleveland, Ohio, has announced a new, complete set of attachments for the Royal electric cleaner to replace the "long" and "short" sets of attachments previously sold.

The Commercial Switchboard Manufacturing Company, of Denver, Colo., has become a subscribing member to the Electrical Cooperative League in that city.

Frank Kohnstamm and Frank Forsee, manager and chief engineer respectively of the Westinghouse Products Company, of Mansfield, Ohio, toured the West shortly before the holidays in the interests of better merchandising.



To the electrical jobber who is used to working only about twelve or fourteen hours a day, golf holds many terrors according to the men assembled at the Jobbers' Convention at Coronado, Calif., recently. During the day when golf was enjoyed these hardy men were forced to ride from tee to tee in order that they might conserve their strength for future contests with brothers in the electrical business. The four men pictured here are prominent members of the 'hit-and-ride' club. Judging from the fresh expressions on the faces of the men pictured above, we would say that the picture was taken before the ordeal on the links. R. W. Murphy, Pacific Coast manager of the Westinghouse Lamp Company, may be seen supported by his sticks and to the right P. H. Booth, sales manager of the Edison Electrical Appliance Company of Ontario, Calif., is imitating the Duke of Durham, monocle and all. B. E. Rowley, district manager at Salt Lake City, Utah, for the Edison Electrical Appliance Company, is completely worn out from the previous day's siege when, after securing a handicap of thirty, for a seventy-two par course, he annexed the silver trophy. Seated to his right is S. B. Gregory, Pacific Coast manager of the Arrow Electric Company, who is trying to arrange to have the car back up to the tee so that he may drive-off without arising from his position.

Trade Outlook

San Francisco

Retail business has just experienced one of the greatest periods in its history. Christmas sales exceeded expectations and in many cases stocks have been cleaned out. The demand for electrical household appliances was almost double that of last year. Tree lighting sets were in great favor. A last moment campaign on the part of the electrical industry had a further stimulating effect on business.

Prospects for the coming year are bright at the present time.

There is every indication that building activity will continue at the same high level set during the latter part of 1922 when all previous records were broken. The shortage of homes is still acute and the decided resumption of activity in industrial lines indicates that many plants will be enlarged.

Despite the failure of Congress to act on the ship subsidy, export houses report large shipments. The greatest demand is for machinery, foodstuffs, automobiles, lumber and wearing apparel. Storms during the month have covered the Sierras with a deep blanket of snow, assuring an ample water supply for irrigation and hydroelectric generation.

Bank clearings for the month of November amounted to \$634,000,000, a gain of \$61,000,000 over the same month in 1921. Banks report collections to be good.

Seattle

Business conditions on Puget Sound are reported exceedingly healthy and indicative of continued prosperity for the new year. Merchants report a satisfactory volume of holiday selling, with a demand from the public for the better class of merchandise. Christmas shopping started unusually early this year, and the volume was well sustained. Prices on most merchandise are appreciably lower, and the public is quick to note this condition.

Although lumber mills and shingle mills of western Washington have thousands of unfilled orders, and are anxious to make the holiday shut-down as brief as possible, early snow and cold weather have curtailed the log supply, and many mills will be forced to close for a considerable period. Virtually all logging camps in the higher elevations have ceased operations, due to weather conditions, and these camps are not expected to resume until late in the winter, and possibly early spring. Many West Side camps are also closed, but a brief period of rain or good weather will make it possible for them to reopen. The lumber industry continues to be handicapped by the car shortage, and this condition affects every manufacturer in the Northwest.

The demand for Christmas electrical goods was excellent during the holiday buying season. Electrical appliances, including vacuum cleaners, washing machines, percolators, irons, toasters, table stoves, waffle irons and flashlights, were in unexpectedly brisk demand. A

number of electric ranges have been sold. There has also been noted a slightly revived interest in radio equipment. The cold weather of the past month has brought about an unprecedented call for small electric heaters, and this appliance is steadily growing in favor.

Los Angeles

Building permits for the first fifteen days of December showed a slight decrease over November. In building circles this was attributed to the unusually heavy rainfall and the holiday season. There were 2,212 permits issued with a valuation of \$5,415,745. This was slightly less than for the same period last year which showed 2,408 permits issued with a valuation of \$6,146,845. Due to the building which has been held up for the first fifteen days of the month, the outlook for the balance of December is most encouraging, and will undoubtedly come up to the same volume as December of last year both in number and valuation of permits.

Bank clearings for the first fifteen days of December amounted to \$268,222,431.57 which compares with the same period of 1921, with \$201,422,196.34, as an increase of approximately 25 per cent. This shows that retail buying is much brisker than a year ago. The electrical retailers reported a very encouraging volume of Christmas business and state that this season has been one of the biggest in their history. The sale of smaller electrical appliances has increased very materially and this may be attributed to the unusually large amount of newspaper advertising being done by all branches of the industry, particularly the electrical dealers.

Salt Lake City

With the close of the year 1922 conditions in the intermountain section present the most hopeful aspect since the demoralization caused by the world war.

One of the features of immense importance to this section is the regaining of financial and industrial poise by the large sugar companies, which are now on a footing to proceed with the conduct of their great enterprises in a sure-footed and confident manner.

In addition to the distribution of approximately \$4,000,000 in October and \$2,000,000 in November among the farmers in payment for beets, the sugar companies distributed about \$1,000,000 to these same farmers under their profit-sharing plan. This has been a life-saver to the farmer, and has in turn been reflected in better conditions throughout this entire territory.

Practically all industries are operating with increased forces, on full time, except smelters and refineries, which are at present operating more than 50 per cent, with prospects of a 100 per cent basis soon.

Jobbers report that the intermountain section is now at its highest purchasing level for a period of several years.

Mining activity continues, and the Utah Copper Company at Bingham is constantly increasing its operations and adding to its forces.

The holiday trade produced a good demand for electrical merchandise for Christmas presents, and the seasonal activity was fairly satisfactory. In Salt Lake City construction work undertaken during the first eleven months of 1922 exceeds that of the same period in 1921 by \$500,000.

Denver

Holiday business proved far better than anticipated and is regarded as another sure index of the again safely entrenched prosperity of this region. With the exception of certain farming areas, all reports from bankers, merchants, and public officials are encouraging. Cold weather has not impeded building operations and with a steadier supply of construction materials, it is believed that the program of the coming year will surpass that of 1922.

The release of nearly a half million dollars of Christmas savings deposits resulted in a brisk holiday trade locally. In electrical lines, added impetus was given by the cooperative advertising campaign. As much as a week before Christmas several jobbing houses were compelled to refuse further orders on a number of popular lines of appliances. Christmas tree lights were in unusual demand along with smaller heating appliances and hollow ware.

Conditions surrounding the wire market are about the same, with several eastern manufacturers bidding low for local representation. There is an ample supply of conduit, armored cable, and loom on hand with improving freight deliveries.

The first week of January will see many Denver electrical dealers busy taking inventory. As a result of the heavy Christmas trade, stocks are low and orders from dealers should be forthcoming.

Portland

Recent cold, dry weather has had an effect on general business conditions. Building trades and general construction have been much reduced and Christmas shopping delayed. The power companies were forced to carry record-breaking loads largely on steam, due to the extreme low water in the streams. The condition has changed in the last week with the coming of warm rains.

Lumber production for the first time in months, is below normal, as indicated by the West Coast Lumbermen's Association report for the week ended Dec. 16, 1922. At that time production was 13 per cent below normal, new business was 14 per cent above production and shipments 2 per cent below new business. Lumbermen in general, however, are very optimistic about the coming year, and point to a steady growing demand on the Atlantic Coast.

A business report from electrical dealers indicates that December business was not as large as anticipated. However, holiday buying in devices and heaters was very active and the volume of electrical appliances purchased as Christmas gifts is expected to exceed that of last year.

Construction News

Bridges

Ariz., Yuma—Southern Pacific Railway plans construction of a \$2,000,000 bridge across the Colorado River at Yuma. The work will include rearrangement of yards at that point. The structure will be located between two buttes known as Prison Hill and Indian School Hill. A rock cut will be necessary at both ends, and a viaduct and trestle on the California side spanning the state highway and the Yuma project canal. The main portion of the bridge will probably consist of a single span, 500 ft. long. Chief Engineer G. W. Beschke is in Yuma arranging for right-of-way and transfer of property. Plans have been prepared and actual work will begin as soon as legal arrangements have been completed.

Ariz., Phoenix—Pacific Construction Company, Phoenix, submitted low bid to state highway department at \$72,336 (or \$1.37 per sq. yd.) for surfacing 5 miles of the Superior Mesa highway with 2-in. asphaltic concrete.

Ariz., Phoenix—Bids are being received by Thos. Maddock, state engineer, for constructing two 75-ft. pony truss spans and three reinforced concrete piers across the Rio Puerco near Sanders, Arizona. The work involves 450 cu. yd. excavation, 160 cu. yd. concrete, 6,500 lb. reinforced steel, steel superstructure in place, wood floor and approaches complete in place. Plans and specifications upon payment of \$5. Certified check 5 per cent.

Ore., Coquille—Bids are asked for by the county court of Coos County for the construction of a steel bridge. The steel bridge will be over the Catching Slough near Marshfield, requiring approximately 66,000 lb. of structural steel, 65 M. ft. lumber, 11,000 lin. ft. piling, 725 lin. ft. trestle and 6,500 ft. of machinery.

Ore., Klamath Falls—The state highway commission is having plans prepared for a steel bridge over the Klamath River on the Klamath Falls-Keno section of the Ashland-Klamath falls highway. The bridge across Lost River about two miles northwest of Merrill has been accepted by the commission. Plans and specifications for the grading of the Klamath Falls-Keno section of the highway have been authorized and the advertising for bids on the actual work of grading will follow soon.

Utah, Salt Lake City—Contract for four bridge structures on the Zion National Park highway in Washington County has been awarded to Snow, Cannon & Kemp, of St. George, Utah, on a bid of \$65,337.71.

Wash., Seattle—Jahn & Bressi, of Seattle, were the lowest bidders for the contract to construct the steel superstructure of the West Spokane Street bridge. Each bidder was required to make an offer under two sets of plans and specifications, one drawn by the city engineering department and the other by the Strauss Bascule Bridge Company. Under the first plan, Jahn & Bressi submitted a figure of \$460,700 and under the latter \$444,923.

Dams

Idaho, Boise—Construction costs for the Black Canyon Dam in the Payotte River near Emmett are provided in the recommendations made by President Harding to Congress of \$1,390,000 for the Boise project. J. B. Bond is in charge of this project.

Ore., Dufur—The Dufur Orchards Co. has asked permission to construct Dead Horse Reservoir, storing 1,500 acre-ft. of water from Eight Mile Creek, Tamarack Creek and Dead Horse Canyon. The dam to be built will inun-

date 60 acres. Work will begin next summer and the total cost is estimated at \$145,000.

Ore., Medford—The contract for the building of the new city reservoir has been awarded to Lindstrom & Fiegenson of Portland. The reservoir is to have a capacity of 2,000,000 gal. and will cost about \$27,500.

Utah, Price—Bonds have been voted favoring the building of the Pleasant Valley reservoir, which will cover 3,300 acres or five square miles of land just below Scofield. The dam will be 120 ft. wide at the base, and 90 ft. high. The building of this irrigation system will cost about \$600,000, and it is expected to be finished so as to store water in the winter of 1923-24 for the 1924 crop season.

Wash., Stevens County—The Inchelium Water Power Company is to build a dam and divert the waters of Stranger Creek for the use of a hydroelectric plant, for power, lighting, manufacturing and irrigating purposes.

Highways

Calif., Ventura—The Fairchild-Gilmore-Wilton Company, L. A. Railway Building, Los Angeles, was awarded contract by county supervisors at \$38,600 for paving 3.05 miles of Guiberson Road about 1 mile south of Fillmore.

Calif., Sacramento—The estimated cost of the proposed Sacramento-Sutter counties extension of the river highway has been placed at \$750,000. The proposed road will be 26.49 miles in length, and will extend from the end of the Natomas Boulevard District 1,000, Sacramento County, to Oswald in Sutter County. The money will be raised as follows: State of California, \$100,000; interested land owners, \$150,000; Sutter County, \$325,000 (including a bridge approach on the highway); Sacramento County, \$175,000. John Russi, supervisor of Sacramento County, H. J. Heiken, of Sutter County, and James K. O'Brien, of Yuba, are directors of the new joint highway district.

Calif., Yuba City—Plans for the proposed 2,000-ft. concrete causeway to span lowlands between the new steel bridge over Feather River at Nicolaus and the west levee have been ordered by the county supervisors to be prepared by Earl Cope, engineer. The causeway will be a link in the proposed Sacramento-Sutter joint boulevard, and will cost approximately \$150,000.

Calif., Sacramento—At a meeting here of members of the state highway commission, a highway district composed of the counties of Santa Barbara, Kern and San Luis Obispo, and the federal bureau of public roads of the U. S. Department of Agriculture, confirmation was made of a contract awarded some time ago to C. H. Hudson, of Los Angeles, for 15 miles of construction on the Cuyama highway from Santa Maria to Maricopa, in Santa Barbara County. The contract price is \$491,602.30. Construction will be under the supervision of the bureau of public roads.

Calif., San Francisco—The contract for completing Sloat Boulevard on the east side from 19th to 37th Aves. has been awarded to Eaton & Smith for \$40,266. This will give two strips of boulevard, each 50 ft. wide, which will permit of one-way traffic for cars using the boulevard between the beach esplanade and the peninsula.

Calif., San Francisco—W. H. Goodin, national director of the Victory highway for Nevada, recently announced that work on the Wehndover route of the highway in that state would start about March 1. A campaign has been started in California to raise \$150,000 for assistance in

this highway construction. The money raised will go to match federal aid and will hasten construction of the road. Mr. Goodin announced that as 91 per cent of land in Nevada is government-owned, it is impossible to build the road without outside aid. Government engineers will make the surveys.

Colo., Denver—The 1923 budget of the state highway department, prepared by L. D. Blauvelt, state highway engineer, will include appropriations totaling approximately \$1,000,000 for improvements on the north and south highway, the state's most heavily traveled interstate road. The improvements will include concrete paving, bridges, tunnels under railroad tracks, etc. Following is a list of the projects on this highway which extends from the Wyoming line to the top of Raton pass, with two branches north from Denver: From Loveland south toward Berthoud, \$92,000; from a point about a mile north of Broomfield toward Lafayette, \$100,000; from Wolfhurst south toward Sedalia, \$140,000; from the end of the last project south toward Sedalia, \$112,000; from Colorado Springs north toward Denver, \$273,000; elimination of two grade crossings south of Colorado Springs, \$25,000; surfacing north of Pueblo, \$25,000; from Trinidad north toward Aguilar, \$90,000; from Fort Lupton north toward Greeley, \$100,000; total, \$957,000. The old projects taken over from the 1922 budget are those calling for the expenditure of \$140,000 for the continuation of the concrete pavement south from Wolhurst and the \$273,000 item for the laying of concrete pavement north from Colorado Springs. With the exception of the two sums set aside for surfacing north of Pueblo and for the elimination of two grade crossings south of Colorado Springs, all appropriations will be used for concrete pavement and subways under railroad tracks. It is estimated the money will be sufficient to construct two subways, one just south of Wolhurst and the other at Breed, about five miles north of Colorado Springs, and extend the pavement twenty miles or more.

Ore., Portland—At a meeting of the State Highway Commission, held Dec. 13, bids were opened on six projects. In the case of the two grading and surfacing projects and the bridge over Lost Creek, all in Lane County, the low bids were satisfactory and all were referred to the engineer to confer with Lane County court. These bids were as follows: Goldson-Cheshire section, Willamette Valley-Florence highway, 4.1 miles—low bidder A. C. Mathews, Eugene, \$40,920. Goshen-Lowell section, Willamette highway, 8.7 miles—low bidder Warren Construction Company, \$82,571. Lost Creek Bridge, Willamette highway—low bidder E. D. Olds, Oak Grove, \$9,330. In addition the following awards were made: Murder Creek section of Pacific highway in Linn County—.62 miles of concrete paving awarded to Soleim & Gustafson of Astoria on a bid of \$15,273. Tangent Shedd section of Pacific highway in Linn County—1.95 miles of paving; referred to engineers with power to act. A. D. Kern of Portland had low bid of \$50,606. Rainier City section of Columbia River highway in Columbia County, .91 miles of paving. Awarded to A. D. Kern of Portland on a bid of \$23,713. Sandy-Cherryville section of Mount Hood Loop, 7.4 miles of gravel surfacing in Clackamas County. A. D. Kerns' low bid of \$24,336 declared satisfactory.

Ore., Salem—An appropriation for the construction of the Mount Hood Loop road was passed at a special meeting of the tax supervision and conservation commission. The amount allotted for the construction is \$245,000, of which \$170,000 will be spent in Clackamas County, while the remaining \$70,000 will be used for the construction in Multnomah County. The entire appropriation will be taken from the state motor vehicle fund.

Ore., Portland—An award has been made by the State Highway Commission to Metzger & Johnson of Roseburg, Ore., contractors, for

crushed gravel surfacing of 12.1 miles of road on unit No. 2 at the Service Creek Valades highway. Their bid was \$38,334.

Ore., Baker—The Johnson Contract Company of Portland has been awarded the contract for the surfacing and grading of 14.35 miles of market road to Baker.

Ore., Portland—The State Highway Commission has under consideration the construction of an interstate highway which will not only tap Washington but will also make connection with Lewiston, Idaho. The matter will be taken up with federal officers in a conference.

Ore., Salem—After two years of negotiations between the federal government and Marion County a contract has been signed, thereby assuring a highway between Detroit and Niagara, Ore. The total cost of the 13 miles of road is placed at \$100,000. Work is expected to start with the coming of spring.

Utah, Salt Lake City—The state road commission has awarded contract for construction of between 7 and 8 miles of gravel surfaced highway between Ash Creek bridge and Anderson's ranch, on the Salt Lake-Zion National Park highway, to McArthur, Winsor and Whitehead of St. George, at an estimated cost of \$87,070.68.

Wash., Spokane—Rock work will be started soon on the unit of the national parks highway between Hepe, Idaho, and Pike River, 8.6 miles of roadway is to be constructed at a cost of \$171,000.

Wash., Spokane—Road contracts amounting to \$300,000 will be awarded by the county commissioners in January, when the bids for the Trent Road and other improvements will be opened. The Trent road will be paved with concrete from the end of the present paving at Trent to the Idaho line. This contract will be for eight miles and will amount to about \$200,000. Another contract will be the seven miles of macadam road extending west from Plaza into the wheat district. Another five miles to be constructed is the Five Mile Prairie Road, also one mile of the Waikiki Road. D. H. Ham is the commissioner.

Irrigation Projects

Mont.—Twenty-three irrigation districts in Montana under state supervision have been projected since the passage of the act by the legislature two years ago, which authorized financing and construction of irrigation projects under state supervision and control. They embrace a total acreage of 332,666. Of these, two have been completed to the extent that the districts have been created and improved and bond issues sold. These are the Red Lodge-Rosebud district in Carbon County and the Whitetail district in Jefferson County. Construction on storage and distribution units will be begun on both this fall.

Nev., Fallon—A contract between the government and the Nevada Valleys Power Company, providing for 10-year lease of the Lahontan power plant to the Nevada Valleys Power Company, has finally been signed by Secretary of the Interior Fall, according to J. F. Richardson, manager of the Newlands project. The Newlands Project Irrigation Board recently suspended approval of the contract owing to the objections of numerous water users. The agreement clears the way for the Spanish Springs reservoir, on which preliminary work will soon start. This work includes construction of the reservoir, dam, ditches and canals. Reclamation service officials state that besides increasing the water supply of the Newlands Project the Spanish Springs reservoir will facilitate reclamation of 87,000 acres of new land, one-third of which lies near Wadsworth in Washoe County and directly tributary to Reno.

Wash., Yakima—The Tieton Water Users' Association contemplates the enlargement of canals and laterals at a cost of \$1,000,000.

Wash., Hillyard—The voters of the North Spokane Irrigation District have voted a bond issue of \$75,000 for construction of a new water system to irrigate the district.

Wash., Wenatchee—Construction work on the new Whitestone Irrigation project in Okanogan County has been started under C. P. Hertvedt, superintendent. During the winter two tunnels will be completed, one to be 1,400 ft. long, 5 x 7 ft. in size, and the other 500 ft. long, 5 x 6 ft. in size.

Wash., Yakima—Voters of the Granger Irrigation District have adopted the plans of the Reclamation Service to irrigate 1,500 acres of land at a cost of \$225,000, as the result of a recent election. Work will be started immediately, and water ready for spring irrigation will be provided.

Wash., Hanford—Actual construction of the Priest Rapids (Wash.) irrigation project by which 80,000 to 100,000 acres of land in Grant County will be irrigated, will begin early in 1923, according to R. A. Hill, Los Angeles engineer.

Power Plant Equipment

Calif., Lompoc—The \$30,000 bond issue to purchase the Lompoc Light & Power plant carried at the recent election.

Calif., Sacramento—Nevada-California Electric Corporation plans to expend about \$8,000,000 within the next ten years for construction work and additions to present system. Included in the new construction work of the corporation, which now supplies power to the mining industry of Nevada and industrial and agricultural districts in southeastern California, will be seven new hydroelectric plants which will give an added capacity of 46,500 hp.

Power Projects

Wash., Spokane—The Washington Water Power Company has sent its second surveying crew into the field to make a preliminary survey for the new high tension power line between the east end of its lines in central Washington to Pateros where connection is to be made with the lines of the Okanogan Light & Power Co.

Wash., Tacoma—City council has granted an appropriation of \$50,000 from the light department funds for clearing the power house site, the equalization reservoir site and the flume line location for the development of the Lake Cushman power project, the appropriation to be met from the current earnings of the department.

Wash., Wenatchee—Chelan County commissioners have granted the Washington Water Power Company a franchise to enter the county at Chelan Falls and run a line north to Okanogan County.

Railways

Ariz., Phoenix—R. E. McKee Construction Company, El Paso, Texas, awarded contract at about \$350,000 to erect the new Union Station, has started work. Construction will be supervised by E. C. Forney and G. H. Wyman of Los Angeles. The structure will be part 2-story and 1-story; 475 ft. long and large enough to accommodate six tracks. It will be Mission style, with pebble-walls and red tile roof.

Calif., Eagle Rock—Architect Frederick Hastings Wallis, 330 Pacific Finance Building, is preparing plans for a railway depot at Eagle Rock for the Glendale-Montrose Rwy. Company. It will be 31 x 28 ft., and will contain a waiting room, office, store and lavatories, monolithic hollow concrete wall construction, plaster exterior, composition roofing, plate glass, cement floors.

Calif., Santa Barbara—The Pacific Southwestern Railroad Company has been authorized by railroad commission to issue and sell at not less

than par \$100,000 common stock, to construct a standard gage line from Lompoc on the line of the Southern Pacific Railway in Santa Barbara County to Whitehills, about four miles.

Calif., Sacramento—The California Railroad Commission has given permission to this city to construct a subway under the tracks of the Southern Pacific Company at 16th and B Streets. Estimate on the cost as prepared by Albert Givan, city engineer, is placed at \$80,000, which will be borne equally by the city and the Southern Pacific Company.

Calif., San Bernardino—W. J. Burton Company has the contract to build about half of a proposed double track line between Daggett and Bagdad, 68 miles, for Santa Fe Railway. Estimated cost of entire project, \$3,000,000. Grading will start at once.

Idaho, Boise—The Oregon Short Line Railroad Company has started work on construction involving the expenditure of \$1,500,000 between Hammett and Reverse. Four lines of track will be abandoned to eliminate the Medbury hill which has caused considerable difficulty to trains with heavy loads. The grade will be changed from 2 to 1.45 per cent and will save two miles in haul. The first work on this project started with the construction of a 10-ft. arch on Bennet Creek. The contract has been let to the Utah Construction Company. The state highway for the distance of a mile paralleling the track will also have to be changed. The new line will be ready for use by the time heavy crop traffic starts next fall. The Oregon Short Line has just completed 18 miles of double-track construction between Hammett and King Hill, involving the heavy expenditure of funds. The company will also construct a railroad link from Orchard to Boise. A handsome depot is to be built in Boise. Plans are being made by Carrare and Hastings of New York. The building will be of native stone and terra cotta and will cost about \$150,000 to \$200,000.

Ore., Klamath Falls—The Strahorn Railroad from Hilderbrand to Sprague River is now in the process of building. The grading contract assigned to Nettleton, Bruce & Echbach Co. of Seattle calls for the sum of \$175,000. In addition to this there is a 1,500-ft. tunnel which this same company will put through under a separate contract. The road must be completed and in operation by the last of May, 1923; 300 men are employed.

Wash., Kelso—The Longview, Portland & Northern Railway Company, organized by the Long-Bell Lumber Company, will receive bids on grading and construction of trestles for the first 8½ miles of its railway, Jan. 2. Bids will be received at the office of the company in Kelso. This will be the first unit of approximately 26 miles of railway to be built by the company to tap the timber holdings of the Long-Bell company. The project involves handling of better than a million yards of earth in grading operations. The railway will be on the west side of the Cowlitz River and the first unit includes the line to a point south from Castle Rock.

Streets and Sewers

Calif., Los Angeles—Chas. U. Heuser, Hotel Clark, Los Angeles, has been awarded contract by Board of Public Works, at \$124,500 for constructing Section 4 of the temporary outfall sewer between Rimpau Blvd. and Ballona Creek, involving 1,800 ft. 48-in., 5,710 ft. 54-in. and 735 ft. 30-in. segmental block sewer at a total of \$107,000, and 3,500 cu. yd. concrete reinforced in place at \$5 yd.

Calif., Watts—City trustees have adopted resolution of intention No. 984 for constructing proposed city sewer system under new proceedings. The contract was previously awarded to Thompson & Packard, of Salt Lake City, but owing to errors in the proceedings, they refused

to sign the contract. Old proceedings were then abandoned and the new resolution adopted. The project will involve 64,746 ft. 6-in., 41,186 ft. 8-in., 17,926 ft. 10-in. and 5,660 ft. 20-in. cement; 2,552 ft. 18-in. pipe; 369 manholes, 55 flush tanks and 6-in. wye for each lot. Work will be done under 1911 Act and 1915 Bond Act. Koebig & Koebig, consulting engineers, Title Insurance Building, Los Angeles.

Calif., Venice—City Engineer Griffin is preparing plans for the opening of Trolleyway between Mildred and Nautilus Aves. Eight street and two sewer projects are in process of formation, all with a view toward opening up the area back of the city of Venice. Work will involve 4-in. concrete, rock and oil paving, walks, curbs, and lighting systems, 1911 Act. Total estimated cost, \$100,000.

Calif., San Marino—Bids are being received by city trustees for constructing an outfall sewer in the city of San Marino, consisting of approximately 2 miles, 12-in. to 20-in. pipe. Plans and specifications are on file at the office of the city clerk, H. W. Joyce, at the city hall, at Huntington Drive and Olive Drive, opposite the San Marino station of the Pacific Electric Railway, or at the office of William Chalmers, engineer, 61 So. Raymond Ave., Pasadena. Certified check or bond, 10%. The sewer is a section of a new Pasadena line running through San Marino and Alhambra to Pasadena sewer farm. Bonds to amount of \$40,000 have been voted by San Marino.

Calif., Fresno—City Engineer Wm. Stranahan is preparing plans for the construction of a drain sewer system in about 20 city blocks along Stanislaus St. from the alley between L and M Sts., to H St. It will connect with the present outfall sewer. The pipe will be 24-in. and will replace the 8-in. pipes now in place.

Calif., Alhambra—Construction has started on the first unit of Alhambra's new sewer system for which bonds to the amount of \$300,000 were voted last June. The city has been formed into districts for this work, district No. 1 being the first section in which mains will be laid. Cox & Teget have the contract for this district.

Mont., Winnett—Sewers are to be constructed for Winnett at the cost of \$25,000, for which bonds have been voted.

Ore., Portland—An extensive street widening plan is proposed in a 1,436-page report by City Engineer Laurgaard, recently filed with City Commissioner Barbur. The report indicates that the combined widening of East Burnside, Couch and Sandy Boulevard, together with the extension of Sandy Boulevard, would cost \$383,425.

Utah, Salt Lake City—Work has started on 17 miles of sewers on extension 410, north of the state fair grounds. The cost of the improvement which includes 29,000 ft. of pipe will be \$85,000, the contract having been awarded to John O'Connor recently. The farmers ward extension, including 20,000 ft. of sewer, is also under way. The contract was awarded to J. L. Griffin and W. H. Burnside at \$120,000.

Wash., Seattle—Estimates for the proposed trunk sewer in 34th Avenue West, et al., places the cost at \$94,273. Work will probably begin early in the new year.

Wash., Pullman—About \$63,000 will be spent for an adequate and sanitary sewage disposal system for Pullman. The state will be asked to contribute part of the expense and the balance raised through the sale of bonds, according to G. H. and H. S. Green, consulting engineers of Spokane.

Wash., Seattle—Contract for installation of sewers and grading in 16th Avenue Northwest, has been let to Tomei & Co. of Seattle, on their bid of \$30,298, for clay pipe.

Wash., Seattle—Contract for sewers in West 62nd Street, et al., has been let to Alexander & McNeil, Seattle, on a bid of \$22,260, for clay pipe.

Wash., Seattle—Hague & Espland, Seattle, on their bid of \$104,706, received the award of contract for paving and trestle work on Railroad Avenue. This work involves 7,750 sq. yd. of concrete paving and 43,000 ft. of creosoted piling.

Wyo., Cheyenne—Resolution before city council to create Paving District No. 1, covering forty city blocks. Actual construction of this \$300,000 improvement will be started in the early spring.

Street Lighting

Wash., Toppenish—A contract has been authorized by the city council of Toppenish to provide for the furnishing of electric lighting service by the Pacific Power & Light Co. for ten years.

Waterworks

Calif., Los Angeles—City council has adopted ordinances calling special elections Jan. 25 for water distributing systems as follows: \$100,000 in Angeles Mesa District (Municipal Imp. Dist. No. 14), and \$200,000 for the Palms district (Municipal Imp. Dist. No. 18). At a special election held Dec. 12, in Sawtelle district, a \$275,000 bond issue for mains and a distributing system carried.

Ore., Orenco—A water merger is being planned whereby several cities in the Tualatin valley will be able to have city water from Portland's supply at a lower cost than if each city had its own system. The project would embrace an area of approximately 200 sq. miles, with an aggregate expenditure of about \$1,000,000.

Wash., Bucoda—A water system is to be constructed by the American Wood Pipe Co. of Tacoma for Bucoda. The system will include two 60,000-gal. reservoirs and will cost about \$25,000.

Wash., Birmingham—The Birmingham Water Company, following a hearing of complaints, has been ordered by the State Board of Public Works to double the size of its trunk line: to extend the intake 1,000 ft. into deep water of Lake Martha, install a chlorination plant, and not to collect further rent until these improvements are completed.

Wash., Spokane—A reservoir for the city water system is to be built on the north side next year, and surveys are now being made for the site. The cost is estimated at \$100,000.

Wash., Odessa—Installation of a filtration plant at Lewiston, Idaho, to purify the water taken from the Clearwater River for city use, will be the solution to the water problem, according to City Water Superintendent E. C. Wagner. The plant with enlargements to the water system will cost \$350,000.

Miscellaneous

Colo., Denver—The Denver and Interurban Railroad Company has started construction of new car barns at Thirty-sixth and Fox Streets, under the direction of Allison Stocker, a local contractor. The new barns are necessitated through the changed routing of the system which brings the interurban cars into the Union Station instead of on the downtown streets as formerly. Modern machinery will be installed, including electric turntables.

Colo., Denver—The Globe Investment Company of which L. C. Fulenweider, George W. Olinger, and R. H. Bosse are the active officers, has practically completed plans for an exclusive residential development project to be known as the Welshire district of this city. Plans provide for complete landscaping of the area, the laying of approximately ten miles of pavement and the installation of an ornamental lighting system.

Wash., Freeport—Pipe Plant—The Concrete Pipe Company has completed plans for a large plant near Freeport in connection with the

Long-Bell Lumber Company's development at Longview. Plant will manufacture sewer pipe for the immense sewer system planned for Longview, which will require more than 50 miles of pipe.

Wash., Seattle—The Associated Oil Company plans the expenditure of \$15,000 in development work at its big \$1,000,000 ocean terminal at 1739 Railroad Avenue. Proposed work includes five large steel oil storage tanks, fireproof warehouse and garage building.

Buildings (Industrial)

Colo., Denver—A three-story building to house the largest taxidermy firm in the West will be built at Tenth and Broadway by George L. Bettcher for Jonas Brothers. An extensive cold storage system will be installed for the storage and preservation of furs.

Ore., Haines—The plant of the Commercial Creamery Co. which was recently destroyed by fire at an estimated loss of \$60,000 is to be rebuilt as soon as insurance adjustments are made. This is announced by A. H. Goodhue, of Spokane, president of the concern.

Ore., Portland—A \$35,000 warehouse is to be added to the Western Coöperage Company's plant. Plans prepared by DeYoung & Roald; the building will be one-story, 200 x 400, with corrugated iron sides and roof.

Ore., Portland—A two-story warehouse for the National Cold Storage & Ice Company is to be built by Bingham & McClelland, 416 Worcester Building. The structure will occupy a 200 x 100-ft. space of ground and will cost approximately \$80,000. It will be occupied when finished by the Pacific Fruit & Produce Co.

Wash., Hoquiam—The Grays Harbor Home Building Corporation has been organized and is starting work on the construction of an \$85,000 factory for turning out lumber cut to patterns for houses. The new company was founded by A. B. Arthaud and Charles Kane.

Wash., Vancouver—A paper mill will be constructed on the water front site of the old Pittcock-Leadbetter Lumber Co.. The investment will be about \$1,500,000 as announced by the California-Oregon Paper Mills.

Wash., Aberdeen—A contract for the construction of a two-story concrete warehouse to be built by the A. A. Star Transfer Co. was awarded to the Green Engineering Co. The building which will cost in the neighborhood of \$45,000 will be built at Hume and K Streets, and will be of the mushroom concrete type throughout and will contain warehouse facilities, freight elevator and office.

Buildings (Miscellaneous)

Calif., Whittier—Bank—Architects John Parkinson and Donald B. Parkinson, 420 Title Insurance Building, report that the new building for the First National Bank of Whittier will be six stories instead of two-story and basement. Contracts have been awarded as follows: General contract to Macdonald & Driver, Douglas Building, structural steel to Baker Iron Works, plumbing to Arthur Hess, and heating to Whittier Hardware Co. Total cost, exclusive of bank fixtures and equipment, \$250,000.

Calif., Los Angeles—Apartments—Architects Russell & Alpaugh, 1106 Story Building, have been commissioned to prepare plans for an 8-story, class A apartment house to be erected at Wilshire Blvd. and Carondelet St. for Wilshire-Carondelet Holding Co. The building was originally designed as a 4-story, class C structure. It will contain 376 rooms and 188 apartments. Cost, \$700,000.

Calif., Redlands—University—V. L. Duke, president of the University of Redlands, and George P. Cortner, business manager, have announced that three new buildings costing about \$150,000 are to be erected before next fall. One is to be the second wing of the great fine arts group. This wing is to be east of the first

wing and will cost about \$35,000. The two wings will later be connected with the big auditorium and chapel to be built; a boys' dormitory, to cost about \$60,000, is to be built just north of California Hall; and a girls' gymnasium with a seating capacity of 1,200 where basketball games will be played is to be erected.

Calif., Los Angeles—Depot—Wurster Construction Company, Union Terminal Building, was awarded contract for erecting an additional building at 7th and Alameda Sts. for L. A. Union Terminal Company. John Parkinson and Donald B. Parkinson, 420 Title Insurance Building, architects. Cost, \$500,000.

Calif., San Diego—Barracks, etc.—R. E. Campbell Construction Company, Salt Lake City, has been awarded contract by bureau of yards and docks, naval department, at \$193,351.60 for constructing a group of buildings at the Loma Portal naval training station. The group will comprise buildings for officers, barracks, pump house, etc.

Calif., Fresno—Lodge—Fresno Aerie, Fraternal Order of Eagles, has announced plans to erect a six-story office building on M and Fresno Streets. The building will cost \$500,000 and will be erected during the coming year.

Calif., Visalia—Bank—Bank of Italy, 550 Montgomery St., San Francisco, is taking bids for the erection of a five-story reinforced concrete bank and office building at Visalia, to cost \$250,000. Plans by Architects R. F. Felchin Co., Bank of Italy Building, Fresno. Mr. Cuneo, of the bank, has charge of construction, figures, etc.

Calif., Visalia—Stores—Offices—F. H. Whipple has had plans prepared for a 3-story brick bldg. which he will build at Bridge and Main Sts. The building will contain stores and offices, and cost \$100,000.

Colo., Colorado Springs—Hospital—Trustees of the Union Printers' Home here have approved an extensive building campaign to include immediate construction of a \$125,000 addition to the main building for hospital purposes. The new structure will provide for 100 patients and will be of the latest design, according to Secretary J. W. Hays.

Colo., Denver—Film Exchange—Construction of an exclusive film exchange building, 125 ft. long and 115 ft. wide and 3 stories high on the new Broadway extension at a cost of \$125,000, has been started under the direction of E. H. Moorman, a local architect, for a Denver syndicate.

Colo., Eagle—Hotel—A modern hotel, three stories high on one of the main business corners, will be built and operated by a local company headed by John Weld. William Redding & Son of Denver are the architects.

Colo., Denver—Offices—A \$350,000 office building for the exclusive use of the district office of the U. S. Veterans Bureau will be built by a local concern opposite the Civic Center providing court action does not interfere. The construction of such a building would upset the plans of the municipal planning commission and because of public sentiment a new site may be obtained. The C. S. Lambie Co. has the general contract.

Colo., Denver—Freight Depot—P. J. Sullivan has been awarded the contract for the construction of the new Union Pacific freight house on Nineteenth Street at a cost of \$300,000. It will be 850 ft. long and will have two stories, part of which will be used for office purposes. Milroy & Horan have been awarded the sub-contract for the electrical work.

Colo., Denver—Apartment—Store—A store and apartment building to cost \$50,000 will shortly be started by Albert Werner, a prominent South Denver merchant, at 76 to 86 South Broadway.

Colo., Denver—Garage—A 6-story garage, the largest of its kind in this section, is planned for construction by George Williams of this city. Thomas F. Walsh is the architect; ground for

the foundation is expected to be broken within a short time.

Colo., Colorado Springs—Store—With the transfer of several valuable pieces of property in the center of the business section to the L. R. Steel Co. for \$250,000, it has been announced that the company will remodel and build a new home for its merchandising activities here. Will L. Hahn of Denver is the western district manager of the corporation.

Colo., Denver—A two-story fireproof office structure to cost at least \$150,000 will be built by the school board of this city for the administrative department of the district. As soon as the bids are accepted construction will be started, according to W. N. Bowman, the architect.

Colo., Denver—Hotel—The first of three palatial apartment hotels to be built in this city by the Fleisher Construction Company will be started before the first of the year, if the plans of W. N. Bowman, architect for the project, materialize. The first building will cost \$400,000 and will contain 45 apartments all modernly appointed. It is understood that electric ranges and refrigerators will be installed.

Colo., Denver—A twelve-story store and office structure, which may include a theater, to cost \$800,000, will be built at 16th and Curtis Streets, one of the principal downtown corners, by the Bishop-Cass Investment Company. Notification has been given to the tenants of the present two-story structure on the site to vacate by June 1.

Colo., Denver—Clubhouse—The Denver Press Club will build a new clubhouse on the site of its present home at 1330 Glenarm place at a cost of \$25,000, according to Warren E. Boyer, the club secretary. One of the features of the building will be the modern system of illumination.

Colo., Denver—Church—Construction work on the new Sacred Heart church opposite City Park has been started, according to Mountjoy & Frewen, the supervising architects. The estimated cost is \$250,000 and when finished it will be the center of a religious community which will include a rectory, parochial school, and convent.

Idaho, Moscow—Dormitories—Two new dormitories for the University of Idaho, one for men and one for women, seem assured by the action recently taken by the University of Idaho Building Association. This association, composed of Moscow business men, will erect the buildings and lease them to the University. The plan calls for work to commence soon on the girls' building and to finish the men's building during the summer of 1923. Each building will cost approximately \$100,000.

Mont., Butte—Hotel—A new hotel to cost between \$750,000 and \$1,000,000 is planned by Architect George H. Shanley of Great Falls. Work is expected to begin as soon as weather conditions permit. A fund of \$300,000 has been subscribed.

Mont., Lewiston—Hospital—A deaconess hospital is to be erected at a cost between \$150,000 and \$200,000, and funds for the same are now being raised.

Mont., Helena—Institution—The State Institution for the Feeble Minded located at Boulder is to have four new buildings costing about \$200,000. The new buildings will afford additional quarters for residents at that institution. The foundations are now in process of construction.

N. M., Fort Bayard—The government will spend \$150,000 within the next few months for the erection of new buildings at Fort Bayard.

Ore., Helix—School—The new Helix High school building has been started, the contract having been awarded to Waale-Shattuck Co. of Portland at \$45,439. Raymond Hatch, of Pendleton, Ore., architect.

Ore., Portland—Apartments—A contract for the erection of a three-story concrete building to be known as the Hendrickson Apartments has been let by Claussen & Claussen, architects, to Contractor E. B. White, 102½ Second St., Portland. The buildings will contain 17 apartments with modern conveniences, including electric ranges. The total cost will be about \$60,000.

Ore., Portland—Apartments—A two-story apartment house to cost \$25,000 is to be erected on East 14th and Hancock Streets. Lawrence & Holford have planned the building with a frame construction and stucco exterior and will contain eight apartments.

Ore., Portland—Salesrooms—A general contract for the erection of the Bergmann Shoe Co. building at 28th and Thurman Streets has been awarded to Roy O. Powers of Portland. The building will cost \$45,000. Claussen & Claussen are the architects.

Ore., Portland—Hospital—General plans for the Shriners' Hospital for Children to be erected on Sandy Boulevard have been approved by the committee and the grading contracts will be let shortly. Sutton & Whitney of Portland are the architects. Plans preparatory for the contractor's figures will not be ready for some time.

Ore., Eugene—Hotel—A nine-story hotel building is being planned by Tourtellotte & Hummel, of Portland, for the location at Willamette and Tenth Streets in Eugene. The work of financing the project is estimated to cost \$300,000, and will be carried on this winter, construction starting early in the spring. Frank Berger and James Clark are promoting the new hostelry. The building will cover 160 x 120 ft. and will be of reinforced concrete with the first two stories of art stone. Six stores will be located on the ground floor, lounging room, restaurant, dining room and large ball room. There will be 148 bedrooms with private bath and 107 without.

Ore., Salem—Institution—The Rounds-Chlist Company is to erect a group of structures for the Oregon Employment Institution for the Blind, to be erected between East 84th and East Glidan Street in Portland, consisting of an administration building, men's dormitory, work shop and power house. Plans were prepared by Houghtaling & Dougan. Contract price, \$105,148.

Ore., Portland—Apartments—A three-story brick apartment house is to be erected on Lowndale St., between Taylor and Yamhill, and will cost about \$60,000. C. L. Goodrich is the architect for the building, the plans of which are in the hands of the contractors.

Ore., Salem—Apartments—A four-story apartment house is to be erected immediately on the corner of Court and Capital Streets as announced by Carl L. Linde, the Portland architect who is to have the supervision of the plans. The Capital Apartments Company is to finance the building of the structure at the estimated cost of \$250,000. The building will be of reinforced concrete and will contain a total of 68 apartments of the most modern type.

Ore., Portland—Store—A two-story retail store is to be built at Park and Washington Streets on the present site of the Star Theater. The structure is to be of steel construction and will have an abundance of show windows on both floors, costing about \$50,000 and owned by A. Gerg.

Ore., Portland—Apartments—Construction of a 3-story apartment house to cost about \$300,000 is ordered by A. S. Ellis. The new building will be located at the corner of Lowndale and Taylor Streets and will contain 27 apartments, each having dumb-waiter service, electric ranges, hardwood floors, and the interior mill work will include mahogany paneled doors.

Ore., Portland—Lodge—A new temple is to be built for the Washington Masonic Building Ass'n on East 8th Street, and will occupy a plot 60 x 100 ft., two stories and basement. C. C. Rob-

bins is the architect. Estimated cost including furnishings is \$65,000.

Ore., Portland—Offices—Rumors, which have been circulating for some time of a ten-story office building to occupy the 200 x 200-ft. block bounded by 5th, 6th, Taylor and Salmon Streets, have been confirmed. A board of directors has been elected and construction will start at once. The building will be a 10-story reinforced concrete fireproof structure. Two floors underground will be a parking place principally for use of tenants, accommodating approximately 500 machines. The ground floors will be used for retail stores and specialty shops divided by three arcades. The mezzanine floor will be occupied by an auditorium containing two balconies with a large seating capacity. The six upper floors are to be devoted to offices. The building will have two 20-ft. escalators and six elevators. It is understood that the architects have been selected but their names have not yet been announced.

Ore., Salem—Apartments—Construction of a 72-apartment establishment to cost approximately \$210,000 and to be located on the site of the old Thielsen home at Court and Capital Streets has been proposed by Warren Armington of Denver, Colo. An option has been secured on the property.

Ore., Portland—Residence—A permit for erecting a \$46,000 residence on Portland Heights has been taken out by Quinn & Burton, contractors, 402 Railway Exchange Building. Max Hirsch, owner; Lawrence & Holford, Chamber of Commerce Building, architects.

Ore., Portland—Salesroom—Plans have been prepared by Strong & McNaughton, engineers in the Corbett Building, for an auto salesroom and repair shop to be erected at 13th and Burnside Streets, at a cost of \$100,000. The building will be 125 x 110 ft., of heavy mill construction, owned by the Weinhard Estate.

Ore., Portland—Institution—A contract to build a \$40,000 Odd Fellows Home for Girls was let to Wm. Friberg, Worcester Building. The new home will be located at 974 Holgate Ave. and will be three stories in height. John Hunzicher is the architect from Eugene.

Ore., Astoria—Hotel—The Columbia Hotel Company's building committee opened bids recently on the construction of Astoria's proposed new eight-story hotel and recommended the acceptance of bids as follows: General construction, Thomas Muir, Portland, \$169,428, building to be completed in eight months; heating, Rushlight & Hasterf, Portland, \$11,000; plumbing, Alaska Plumbing Company, Portland, \$15,898; electric wiring, National Electric Company, Portland, \$4,300.

Ore., Portland—Church—A church building to cost \$50,000 has been planned by Lawrence & Holford, architects for St. Michael's and All Angels' Episcopal parish, and is to be erected at East 42nd St. and East Broadway. A parish house also is to be built on the premises.

Ore., Portland—The remodeling of the 12-story building recently purchased by Porter Brothers, railroad contractors, will cost approximately \$100,000. Mr. Lackore, of Spokane, is to supervise the remodeling according to plans of the company. It is to be made into a first-class office building.

Ore., Portland—Hotel—Plans are being prepared by James Watt, architect, for a four-story store and hotel structure at the northwest corner of 12th and Alder Streets for J. J. Jennings. The building will cost about \$75,000, and will be of brick with cast plaster and terra cotta trimmings.

Ore., Portland—School—Howell & Knighton, architects in the U. S. Bank Building, are preparing the plans for the Northeast High School. The building will cost approximately a quarter of a million dollars. Plans will be ready for figuring about the first of the year.

Ore., Portland—Lodge—Plans for the new Al Azar building, which will be erected by the United Artisans at the corner of Third and Columbia Streets, this city, have been completed. The building will be two stories in height, with two large assembly halls, a double stage and a banquet hall. The structure will occupy a space 100 x 100, and will cost in the neighborhood of \$75,000.

Ore., Pendleton—School—The Waale-Shattuck Construction Company of Portland is to build the Griswold Union High School at Helix. The building will cost \$60,000 and is to be completed in August, 1923. It will be red brick, trimmed with terra cotta and will contain in addition to the class rooms, a gymnasium and assembly hall.

Ore., Portland—Apartments—A new apartment house just completed costing \$55,000 and of the latest type, has the high class equipment which includes electric ranges of the latest type in each of the eleven 4 and 5-room suites. The structure is located at the southeast corner of Vista Avenue and Laurel Street and is a three-story brick and concrete building. The design was compiled by Clausen & Clausen, architects.

Ore., Astoria—Hospital—The Fraternal Hospital Association structure is to be started soon on the corner of 16th and Exchange Streets and will cost about \$150,000. Sven Lonberg is secretary of the association which is building this modern hospital.

Utah, Provo—City and County Bldg.—Contract for the completion of the new city and county building at Provo has been awarded to Rudine & Chytraus of Salt Lake City, at a figure of \$156,741.

Utah, Salt Lake City—Ry. Station—Contract for the entire building of the new joint terminal station of the Salt Lake & Utah Railroad and the Bamberger Electric Railroad, on the site of the present building, has been let to Jacobsen & Hodgson of Salt Lake City, for \$163,000. Construction is to begin immediately. Young & Hansen, of Salt Lake City, are in charge of the architectural work. T. E. Thomas, of Ogden, was awarded the contract for plumbing and heating work, at \$21,300. Contract for the electrical work was let to the Salt Lake Electric Supply Company for \$9,494. The terms of the contract stipulate that the new building shall have been completed and be ready for occupancy within 150 working days. This means that the doors will be thrown open to the public in about eight months. The new structure will be two stories high, and will have a frontage on South Temple Street equal to that of the present building, plus the distance from the east side of the building to the corner of West Temple and South Temple Streets, with a considerable frontage on West Temple Street.

Wash., Spokane—Temple—Preliminary plans for the new Masonic Temple were approved recently by the trustees. Final plans were ordered prepared by Rigg & Vantyne, architects, who have estimated that the building will cost \$300,000. The new location lies just east of the old temple. Work will be started in the spring.

Wash., Tacoma—Hotel—A site for the proposed new Tacoma community hotel to be built by the citizens of Tacoma at a cost of \$1,000,000, has been selected by popular vote, and construction work will proceed immediately. Site is 215 x 133 ft.

Wash., Tacoma—Church—The First Presbyterian Church building committee announces that plans are proceeding for the proposed new \$250,000 church structure to be built in the city, and that construction will start early next year. Site has been selected, and plans provide for a church with seating capacity of 1,200 to 1,500.

Wash., Seattle—Store—Preliminary sketches have been completed for a proposed 7-story steel and concrete retail store building to be built at

Second Avenue and Union Street for the Arcade Building and Realty Company, owners of the site. The building will cost approximately \$500,000 and will be 108 x 120 ft. in size. David Whitcomb is president of the company.

Wash., Seattle—Store—Jacobson & Mangrum, New York Building, have the contract for construction of a \$25,000, two-story brick building to be erected by S. T. Toby.

Wash., Kelso—The Long-Bell Lumber Company, builders of the new town of Longview near Kelso, will proceed immediately with the construction of a 250-room hotel, and 250 four and five-room cottages, in addition to five large dormitories. R. A. Long, chairman of the board of directors, has arrived in the city and is directing operations.

Wash., Seattle—Home—Architect John Graham has completed plans for the \$1,000,000 Home for the Aged to be erected by the St. Vincent Order in Seattle. The structure will be built in units, the main building to be five stories high, of reinforced concrete construction, 276 x 294 ft. in size. Bids will be called at once.

Wash., Longview—Stores and Offices—The Long-Bell Lumber Company plans immediate erection of a store and office building to cost \$80,000 in this city. The structure will be 120 x 150 ft., three stories high, of mill construction. Longview is the new town being constructed by the lumber company and which, it is believed, will have a population of 30,000 within a short time.

Wash., Spokane—Lodge—Knights of Columbus order plans the erection of a \$250,000 lodge building on a site to be selected at once. Plans provide for auditorium, ball room, lodge rooms, gymnasium, swimming pool.

Wash., Seattle—Store—E. F. Sweeney Investment Company plans the construction of a three-story and basement, 130 x 108 ft., brick and terra cotta, sales and service station for the Ford Agency. The structure will cost \$85,000 and will be occupied by the William McKay Company.

Wash., Seattle—Apartment—J. H. Williams, here, plans the immediate erection of a 10-story apartment building, of reinforced concrete construction, to cost \$250,000 and to be 60 x 120 ft. in size. The structure will contain 100 apartments of two and three rooms each. Electric elevators will be installed, and each apartment equipped with an electric range.

Wash., Seattle—Store—Mrs. William B. Bebb plans the construction of a two-story store and loft building to cost \$85,000. Architect and Engineer Henry Bittman prepared plans, and Parker & Wood, Arcade Building, have the general contract.

Wash., Seattle—Hotel—J. Otis Post of the firm of George B. Post & Sons of New York City, selected as architects for Seattle's new community hotel, is in the city preparing tentative drawings for consideration of the board of directors. Associate architects in Seattle are Bebb & Gould. The structure will contain 650 rooms, with foundation for additions permitting of 900 rooms, and will cost \$2,800,000. The hotel will be operated under lease by the United Hotels Company and Roy A. Carruthers of New York City. Financing has been completed by sale of bonds to Seattle citizens.

Wash., Walla Walla—College—Final plans for the Whitman College men's dormitory have been completed by Architect A. Lawrence of Portland and call for bids will be issued immediately. Building is to be completed by September, 1923.

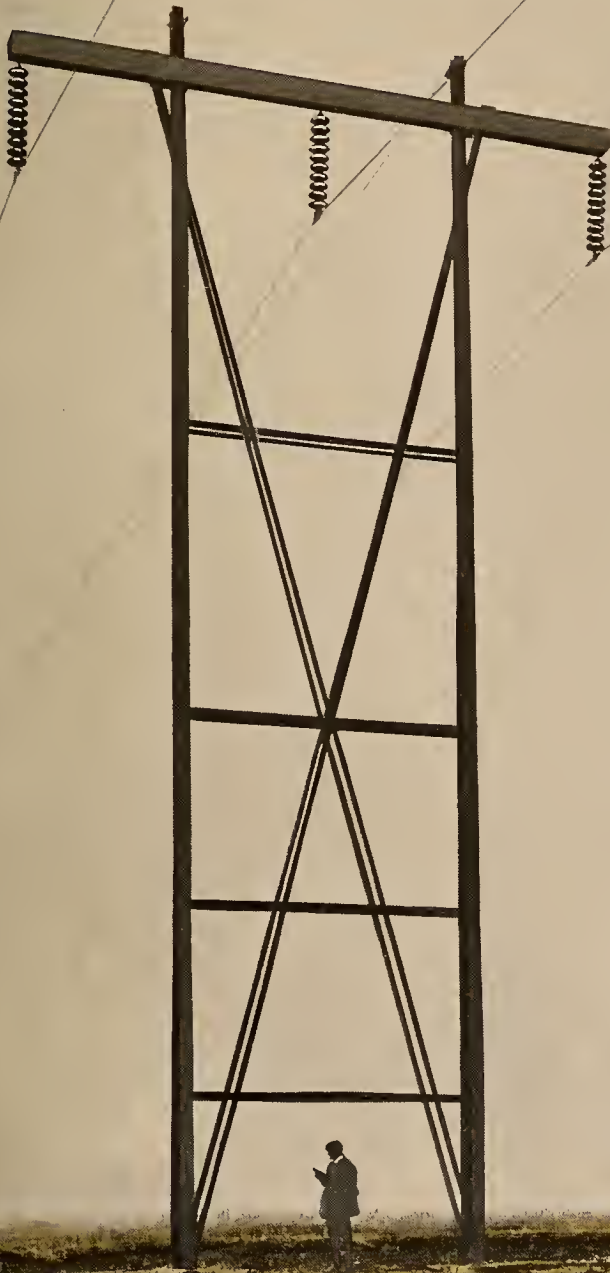
Wash., Seattle—Store—Architect Harlan Thomas, Arcade Building, has completed preliminary sketches for a proposed seven-story steel and concrete retail store building to be built on Second Avenue and Union Street at a cost of \$500,000. Structure will be 108 x 120 ft., and will be built by Arcade Building & Realty Company.

Journal of Electricity and Western Industry

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January 15, 1922

San Francisco



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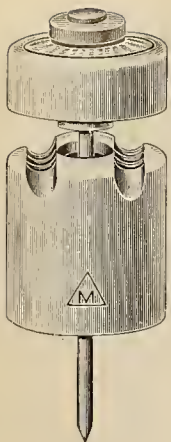
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Journal of Electricity and Western Industry

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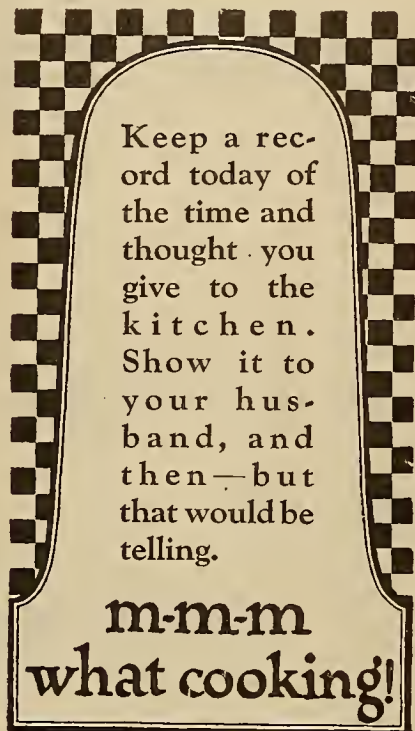
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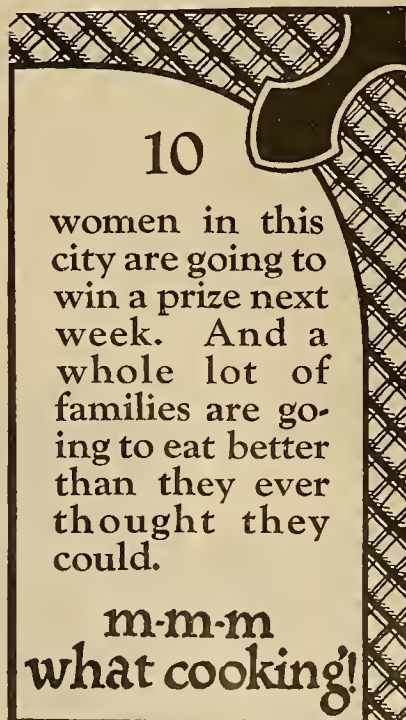
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These Advertisements



Keep a record today of the time and thought you give to the kitchen. Show it to your husband, and then—but that would be telling.

**m-m-m
what cooking!**



10

women in this city are going to win a prize next week. And a whole lot of families are going to eat better than they ever thought they could.

**m-m-m
what cooking!**

are only a few of the "teasers" that start a campaign with which you can move a large quantity of Crawford Electric Ranges out of your show-rooms onto your domestic meters; they are not half as interesting here as they are when you see them in their place in "The Crawford Plan."

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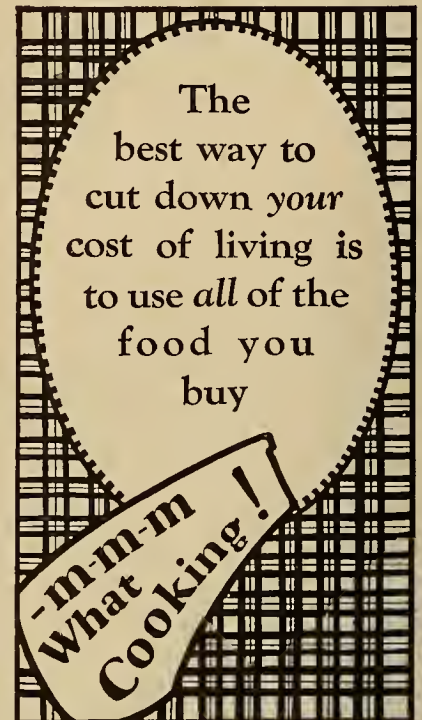
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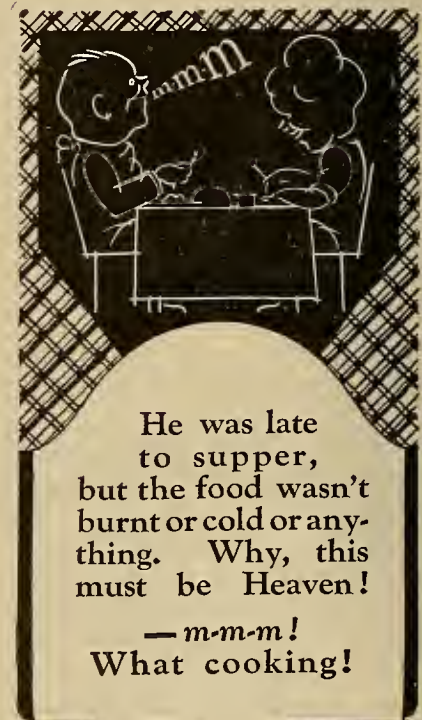
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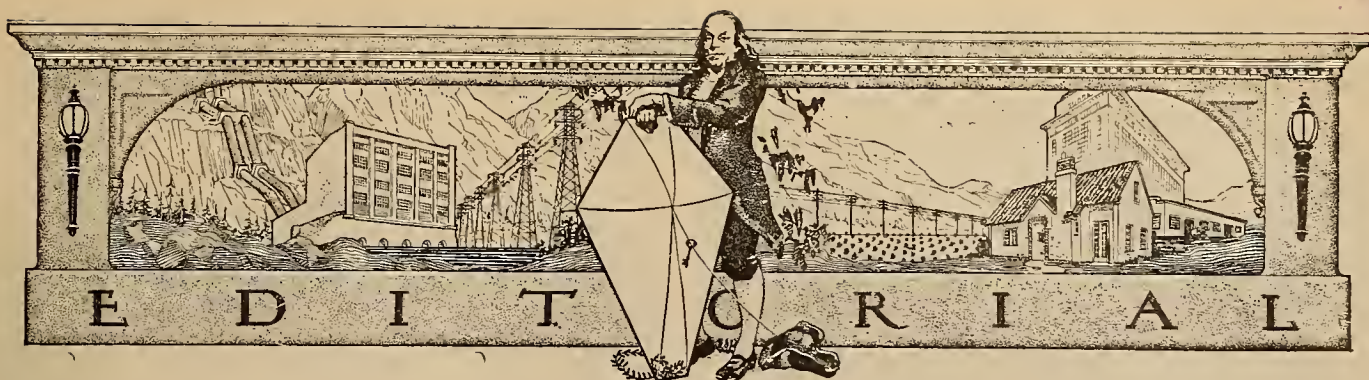
The best way to cut down your cost of living is to use *all* of the food you buy

**-m-m-m
What Cooking!**



He was late to supper, but the food wasn't burnt or cold or anything. Why, this must be Heaven!

**— m-m-m!
What cooking!**



"By Their Fruits Ye Shall Know Them"

THE State Railroad Commission of California, since its reorganization in 1910, has established an enviable reputation for impartiality and justice. Its decisions have been quoted by the courts and by other commissions and the opinions of its leaders have been sought on questions of national importance.

THE Journal of Electricity and Western Industry has repeatedly championed in no uncertain terms the principles of private ownership of public utilities under commission regulation. It is proud of the tradition and reputation of the California commission. It believes that sound utility regulation as practised by the California commission is the corner stone of industrial prosperity.

UTILITY regulation should be no more connected with politics than the Supreme Court of the United States. Recently considerable comment has arisen in the press, and elsewhere, caused by eleventh hour appointments to fill four vacancies on the State Railroad Commission of California. The manner of these selections was unfortunate. The outgoing governor, who had failed of re-election by a large majority, took advantage of an opportunity to fill existing vacancies with his own appointees, for whose acts the new administration will be held responsible. It is regrettable, indeed, that appointments to a body of such importance should savor in the slightest of rewards for political service. Yet regardless of the qualifications of the new commissioners, it has been pointed out that two of the appointments appear to be just that.

WHEN the State Railroad Commission was reorganized, apprehension was felt that the commission might be used as a means of serving the ends of partisan politics, that the almost plenary power vested in the commissioners, if injudiciously exercised, might seriously retard, even wreck, the industrial development of

the State. At best, it was regarded as an important experiment in political economy, the result of which was awaited with anxiety.

THE basis of the apprehensions of the people was that of personnel. Would the Governor's appointees measure up to the grave responsibilities of their office? The answer is found in the story of the growth of California's public utilities, a growth unparalleled in history. To John M. Eshleman, Max Thelen, E. O. Edgerton, and their associates is due the credit for having created a new concept of the efficiency of private ownership and development under impartial state regulation. The rights of the consumer, and of the stockholder have been conserved. Electric service is furnished at reasonable rates, and the securities of California electric utilities are regarded as among the soundest in the nation.

NO greater misfortune could befall California than to have public confidence in the commission disturbed. But—institutions with a reputation and a tradition for impartiality and high standards have a way of carrying on through successive administrations. It is also true that a vigorous advocate often makes an excellent judge. Therefore, regardless of the past affiliations of the members of the new California State Railroad Commission, whatever they may have been, they should not be pre-judged. They are entitled to a chance to show, by their acts, that they propose to maintain the honorable traditions established by their predecessors. They are entitled to a square deal, without prejudice and without favor.

THE Journal of Electricity and Western Industry feels confident that the Railroad Commission of California is composed of sincere men of high ideals, but it resents the intrusion of "politics" into the selection of men called upon to exercise a vitally important judicial function.

Electric Heating Should Not Be Unwisely Discouraged

A MOST interesting communication appears in another section of this issue, which, as the writer suggests, is deserving of wide circulation. The communication states, in effect, that electricity is never destined to supplant other fuels for heating residences or offices on a large scale, because the current cannot be produced at a cost low enough to compete with other fuels even in a territory where fuels are very costly. It is also stated that the heating business is not generally a desirable load since the seasonal peak for this type of service coincides with the lighting peak.

The Journal of Electricity and Western Industry has given some backing to the idea of the practicability of electric house heating in the past. We hold no brief for the "chimneyless town"; because there is not enough electricity capable of generation entirely to supplant other fuels, if such demands were ever made, and it is improbable that such will occur. But we do believe that electric heating has its place.

Untruths, half-truths and statements as to "cheap hydroelectric power" appearing in newspapers tend to give a wrong idea as to the possibilities of electric heating. It should not be absolutely condemned, however. There is a real province for electric heating. Under certain conditions it is actually cheaper than other systems, as has been demonstrated in certain sections of the West where the gain made by doing away with a janitor and a lowering of insurance rates has more than made up for the increased cost of electricity. This condition is not generally true throughout the West. In most cases electricity is more costly than other methods of heating.

While it is probably true that electric heating must be classed among the luxuries, this, however, is not a fundamental objection. The power company which would attempt to discourage the use of electricity for heating because it believes it would prove too heavy a burden upon its consumers' pocketbooks, is doing harm not only to itself but to the entire field of electric use. Let the power company furnish power at such rates as will furnish a reasonable return on its investment, not attempting to make too much of a sacrifice in order to further this load. It should publish the facts of the case in detail, allowing the customer to know the full expense which he will have to bear and then let him use electricity for heating if he so desires.

People are inclined to do what they want to do, regardless of advice. Well meaning economists have deplored the tendency toward extravagance in people of modest income in the purchase of automobiles. Yet the demand for automobiles has persisted, as will electric heating. The public will buy electric heating, and automobiles, and pay the price. If a power company takes the position of actively discouraging this vision of electrical comfort which the public has made for itself, it will merely arouse a feeling of resentment which may eventually result in the public's acquiring a power system of its own where it can have what it wants. In so far as power com-

panies are successful in discrediting the use of electricity in this field, they to some extent discredit electricity in every department.

Immediate Need Exists for Study of Distribution Costs

THE general problem of the distribution of commodities is one that may well engage the attention of all those who are responsible for the organization and operation of the electrical industry. It is clear that one of the largest problems that industry, in general, and the electrical industry in particular, must attempt to solve within the next decade is the problem of simplifying and perfecting an economical system of distribution that will meet our particular economic situation. We have been more interested in the primary problem of production than in the secondary function of distribution. Hence, while the past half century has witnessed a remarkable increase of efficiency in production, resulting in large part from the careful study of production costs with, naturally, a tendency to a continuous decline in these costs, marketing costs have received little study, with the equally natural result that the cost of distribution has increased both positively and in proportion to the cost of production.

Intent upon the project of developing and perfecting large scale production methods, business executives have not fully realized that, as the size of the manufacturing unit has grown, the problem of distributing the product has changed. With the increase in the amount of a commodity manufactured in a particular district has come the necessity for the distribution of the commodity over larger areas. Naturally, in order to cover the additional expense, prices have increased until the margin between the ultimate selling price to the consumer and the manufacturing cost is so great as to cause comment.

During the past few years the retailer and the wholesaler have begun to see the necessity of studying that phase of distribution for which they are responsible. Several trade associations, in lines other than electrical, have cooperated with economists in the effort to compile accurate statistics and to deduce from them certain working principles. Merchandising, both retail and wholesale, costs too much; whatever the cause or explanation, whether it be wasteful competition or inefficiency, we must know the facts before we can attempt the solution of the problem.

The problem is not new. It has been recognized for some time that facts were needed, but until recently no agency existed in the electrical industry which could properly undertake the task. With the organization of the Joint Committee for Business Development, an agency adequately equipped to attack the problem is at hand.

In line with the suggestion in the Committee's announcement of objects and purposes, appearing in the December 15 issue, that definite plans or activities be suggested, we propose that a study be made of distribution costs within the electrical industry.

Adages Are the Fruit of Knowledge and Long Experience

THE old saw that "the best booster for business is a satisfied customer" has been revamped and revised, used as an advertising slogan, employed as the theme for everything from speeches to circular letters and has been badly overworked. It is one of those self-evident truths of which we are apt to say "I know that" and immediately forget. Occasionally we find a man, who, believing in the logic of the phrase, applies it to his business and prospers.

Such was the contractor-dealer who installed a radio receiving set in a home which housed a bed-ridden wounded soldier. For sentimental reasons or otherwise he took especial pains with the installation. The goodwill which he created by his interest, and the success of the installation resulted in the sale of an electric range and an electric washer in this home. He made a friend and a booster for his business. So pleased and enthusiastic was the housewife that she gave him the names of four of her friends who were contemplating the purchase of washing machines. He made four sales and four more friends. Today he employs three salesmen, all of whom work upon a prospect list which has been compiled in this manner.

In recounting this experience the contractor-dealer said, "Believe me, the booster for business is a satisfied customer." We agreed with him and have not forgotten. The phrase may be overworked; it may be trite, but it is true.

The Electrical Merchant's Day to Promote Show Window Lighting

SHOW window lighting presents a comparatively undeveloped market of large proportions, and an analysis of the central station load in the West shows that the activity ranks well up among the major sources of power company revenue. To assist the industry in developing this market a movement has been launched by the California Electrical Cooperative Campaign to promote better show window lighting. An exhibit of a model window with proper convenience outlets and other electrical accessories will be brought into the various meetings of business men in the metropolitan centers. The idea is to stage an electric merchant's day on such occasions, in which the appeal will be made to the merchant for better window illumination. The electrical men themselves on these occasions will remain in the background and the merchants of the communities will be given free opportunity to express themselves on the good results to be obtained from better window lighting. The cost of such an exhibit and the amount of money necessary to hold meetings is not excessive. An exhibit of this type will have beneficial effects if pushed during the summer months, prior to the fall buying period. There is a great need for better lighting and this can only be brought about by a knowledge of the basic principles of wiring, color schemes and other things concerned with show window lighting. Now is the time to begin the planning.

California Leading State in Hydroelectric Production

A REPORT recently issued by the United States Geological Survey on the water power production of the United States for the first seven months of the past year shows that California led all the other states in the production of hydroelectric power, producing 21.4 per cent of the total hydroelectric output of the entire country.

During the seven months' period a total of 10,239,366,000 kilowatt-hours was generated in the United States, of which 2,199,945,000 kilowatt-hours were generated in California. New York, with its Niagara Falls Development, ranked second with 1,652,853,000, Washington third, with 687,992,000, Montana fourth with 534,252,000, and South Carolina fifth with 500,877,000. All the other states combined produced 4,663,447,000 kilowatt-hours. Another significant fact brought out by the survey is that during the seven months the California output increased 48 per cent as against an increase of only 7 per cent in New York.

The Mutual Obligations in Industry Should Not Be Disregarded

THE workers who contribute their labor to a given business, the individuals who invest their savings in the undertaking, and those who direct its operations and policies, must all receive their return from the earnings of the enterprise. It is to their common interest that those earnings should be maintained at the highest level attainable.

Earnings increase as productive efficiency and selling service improve. This improvement may result from added effort or capacity on the part of employees; from superior intelligence of management in the conception and application of new and ingenious ideas and methods which secure the result without additional effort from the workers; from greater contributions of capital by the stockholders, making possible extension and improvement of facilities with the consequent increase of capacity; or preferably from a combination of all three factors.

There is, then, a partnership of interest among the three essential elements of industry which demands cooperative recognition by each. None may selfishly or unjustly view the position of the others without destroying the opportunity for the success of all. None may ignore the true interest of the others without defeating the primary purpose of its own participation in the joint undertaking.

Human instinct is fundamentally selfish and self interest has always tempted men in every walk of life to ignore, more or less, their obligations to their fellows when by so doing they seemed to improve their own economic status.

Intelligent men in industry are now quite generally convinced that in the final analysis it is not to their best interest to disregard their responsibilities toward those in their employ and the demonstrated success of many efforts in the nature of cooperative action has long since removed the matter from the experimental field.

CURRENT COMMENT



One of the national banks in Denver early in 1921, as part of the extensive advertising campaign instituted a course of instruction in budgeting of personal accounts both for customers and outsiders. At the conclusion of the first year, prizes were offered for reports on individual accomplishments in budgeting and the most interesting factor developed in nearly all the reported experiences was the part electricity played in economizing in the home. And now, after another year of experimentation in this line, the bank has issued a similar report and frequent mention is made of laundry equipment, heating appliances, and other electrical devices which have assisted in establishing thrift in many Denver households.

One family with a monthly income of \$205 was able to save 10 per cent of that amount because, as the housewife said, . . . "Having all modern electrical conveniences helps us to save in operation, so our percentage here came to just the estimate."

What better selling talk could be found for the electric washing machine than the statement of this Denver woman—"I do all my work with the help of an electric washing machine. This not only saves the wages paid to help but I am much more saving with gas, electricity, soap, and wear and tear than I could expect any kind of help to be." Some progressive ironing machine representative is going to sell that woman one of his machines and he will experience little resistance, if any, because that particular housewife is sold on the idea already.

Confirming the economy of operation in this case, are the figures of \$256.10 for the entire household in eleven months and of this amount gas and electricity totaled but \$44.98, or a trifle over four dollars a month.

Another case, that of a family of four with an income of \$120 a month, where thrift and economy must be practised but where the principal labor savers are much in evidence, is explained in the statement of the husband, a bookkeeper, who says, "We try to keep below \$4.00 per month on the gas and electricity, which covers current for the electric washing machine, iron, toaster, vacuum sweeper, besides gas for cooking and lights."

Lack of income has prevented another Denver family from enjoying the fruits of electric labor-saving devices as well as a telephone. Music was included in the same class. However, in the 1923

budget of that family, provision is being made for these features and a washing machine and other appliances can be considered as sold already, if only a progressive merchandiser makes an early contact.

These are reflected as concrete instances where the idea—the service resulting from an intelligent application of electricity—has made home life easier. In no case can it be supposed that any of the accomplishments were due to one particular type of machine as compared with another but rather, as is known in several cases, the washing machines referred to are near the top in prices.

Someone sold the idea to those budgeteers in keeping an intelligent check-up on household operations, and as a result, a clearly defined conception has been obtained as to the part electricity has assumed in solving the problems of the home.

Electricity, gas and the telephone and street railway are going to college—not figuratively, but literally. In recognition of the every-day importance of the

Universities in Colorado Teach Utility Subjects

industry which furnishes these three vital things, every university and college in Colorado will take up their study from an economic standpoint. "Beginning immediately after the first of the year the students of the University of Colorado, Boulder; State Agricultural College, Fort Collins; State Teachers College, Greeley; School of Mines, Golden; Colorado College, Colorado Springs, and Denver University will take up the study of the economic phases of the electric light and power, telephone, gas and street railway business. Colorado, long recognized as one of the most progressive states in the Union with respect to its institutions of higher education, thus takes another advanced step.

The idea of making public service a university study originated with one of the state's leaders in educational matters. In keeping with their avowed desire to make an open book of their affairs, public service companies of the state readily adopted the suggestion. These organizations, through a centralized agency, on request of the institutions, will provide a part of the data to be utilized in the instruction of classes and seminars. Some of the chief executives of the larger utility organizations of the state, as well as department heads, engineers and other specialists in their particular line, will render direct assistance in the class rooms, when called upon to do so.

The public utility companies' relation to the prosperity and general well-being of every individual in the community it serves; the vital part public service organizations are taking to help restore prosperity; problems of regulation, rate-making and kindred subjects in which everybody is interested will receive careful study in all of the institutions.

Not only will these studies afford the students a more accurate perspective of the public service business as it relates to their future home and business affairs but, in addition, the knowledge thus gained will help to equip them for taking up some phase of activity in this vitally important industry.

The combined reports from the various lumber companies in the northwest indicate that the year 1922 has been highly satisfactory and profitable, the car shortage excepted, and that 1923 heads out even brighter than ever. Last year the lumber industry was just recuperating from the losses of 1921. In 1923 it should show a large credit balance, according to present indications.

A year ago mills of the Northwest were just emerging from the very disastrous experiences of 1921, which was characterized by large production and high labor costs, with prices so low that the shipments represented definite losses. The demand for lumber from the agricultural districts virtually ceased and the inability of Europe to pay for lumber caused a large reduction in the total shipments of the year.

No vessel in the world will have finer electrical equipment than the S.S. "Leviathan," taken over from Germany during the war, and now undergoing reconditioning for service in the North Atlantic run at the plant of the Newport News Shipbuilding & Drydock Company. The steamer is the property of the United States Shipping Board. Some idea of the scope of the electrical installation can be obtained from the following facts, taken from the report of Rear Admiral W. S. Benson, commissioner of the Shipping Board.

If all the various size wires in the single and multiple conductor cables were put together end for end, thus forming a single conductor of different diameters along its length, it would reach from New York to Norfolk, a distance of approximately 400 miles, the total weight of this wire and cable being about 360,000 lb. Even this does not cover all the wire on the vessel, for there are many more miles of it concealed in the windings of the various appliances and apparatus.

The number of wires entering a single appliance varies from 1 to 1,300. The cross-section of the wires used for conducting the current between the apparatus varies from 0.0008 sq. in. to 1.18 sq. in. The latest type of Navy standard lead and armored cable is used in all spaces subject to dampness and in all working parts of the vessel. In the passenger

accommodations, armored cables are used and every precaution has been taken in their installation to lessen the fire risk, such as the provision of special outlet boxes at fixtures, kick pipes at the decks, guards to prevent injury of conductors and the like. Only about 10 per cent of the original wiring remains in the vessel. Great care has been taken in the installation of the wiring to allow for expansion and contraction. Both the wiring and fittings and all electrical equipment are designed to meet the most rigid underwriters' tests and inspections.

For controlling the electric current in the multitude of circuits 9,000 switches of various types and sizes are used, the largest being capable of handling 6,000 amperes and the smallest 2 amperes.

In order to adequately light the some 4,000 rooms of the vessel, approximately 15,000 lamps are required. Many festoons and the like are also provided for decorating the vessel on special occasions. Some idea of the power required to fully illuminate this vessel can be more clearly comprehended when one realizes that the electric current consumed in one evening between the hours of 7 and 11 would supply the ordinary home for seven years.

California leads every other state in the Union in hydroelectric development, even surpassing New York, which has harnessed Niagara Falls, according to the annual report of the State Railroad Commission. Between California Leads All States in Hydro Projects \$50,000,000 and \$60,000,000 a year is being spent by the electric utilities in meeting demands for power, the larger part of this outlay being for hydro projects.

"While it is difficult to visualize this tremendous development," the commission says, "it requires only a moderate exercise of the imagination to sense the industrial and agricultural supremacy that will result from the productive utilization of the inexhaustible water resources of the Sierra."

Discussing electric development with specific reference to the work of some of the larger companies, the report of the commission reads:

As the commission's jurisdiction does not extend over publicly owned projects, the figures touching development in this report are confined to the undertakings of private companies. During the calendar year 1921 approximately \$50,000,000 was expended on electric development, while the construction programs of the larger companies for 1921 call for an expenditure of over \$60,000,000.

For the year 1921 Pacific Gas & Electric Company and its subsidiary, Mount Shasta Power Corporation, led in development work, with an expenditure of over \$18,000,000, while for the present year Southern California Edison Company heads the list with an estimated expenditure of \$22,500,000.

Great Western Power Company in 1921 completed the first unit of its Caribou plant, expending during the year \$4,760,000.

San Joaquin Light & Power Corporation spent \$7,584,000 in 1921, completing its Midway steam plant and increasing the capacity of its Kern Canyon hydroelectric plant. Its 1922 construction called for the expenditure of \$6,374,000.

During the past year the four big power companies—Pacific Gas & Electric, Great Western, San Joaquin and Southern California Edison—developed 170,680 kva., or approximately 227,500 hp.

DISCUSSION



Oregon Professor Holds Electric House Heating Impractical and Uneconomical

To the Editor:

Sir: For some time both the Oregonian Journal and the Portland Telegram have been devoting considerable editorial space to the advocating of house heating by electricity. Through all of the editorials, the low heating rate offered by the City of Tacoma has been cited in endeavor to make rates in Portland the object of unfavorable comparison.

Unsubstantiated statements and vague generalizations which appear too often in the daily press are apt to cause popular misunderstanding of the practicability of electric heating.

I am attaching one of the editorials which appeared in the Portland Telegram and an answer by Professor S. H. Graf, head of the mechanics and materials laboratory at the Oregon Agricultural College, which appeared in the same paper.

To my mind, the answer is a fitting one, coming as it does unsolicited and from a man not in the employ of an electrical utility company. I believe that Professor Graf's letter is of importance and deserves wider circulation, as it correctly recites the situation insofar as the sale of electric energy for house heating purposes at $\frac{1}{2}$ -cent per kw-hr., or anywhere near that figure, is concerned.

One of the editorials which appeared in the Portland Telegram follows:

"Waste wood may be seen from any direction looking from any elevated point in Portland. And yet fir wood laid down in the home basement in this city costs \$10.50 a cord; ash, \$11.50; oak, \$13.50. Ten years ago the price was but half this figure. Ten years hence the price will be higher yet, if the diminishing supply of wood has anything to do with the price. It is doubtful if wood will ever be any cheaper than now.

"Domestic soft coal from Wyoming, Utah and Washington costs the householder \$15 a ton put into the cellar. Briquettes cost \$16.50 a ton. These prices have risen at about equal pace with that of wood. The future increase in the cost of coal will arise from the increase in the cost of getting it out of the mine and transporting it by rail or ship. The supply will not diminish much.

"At the price of coal and wood now ruling, the average eight-room house costs from \$125 to \$175 to heat for the year. This includes the cost of cooking fuel and that used in heating water for domestic purposes. Tacoma is furnishing all this service at prices that do not at all exceed these figures.

"We are coming eventually to heating all modern homes on this West Coast by electricity generated by water in the hills behind us. In Tacoma

is to be seen the first well planted mile post on our road to this much-to-be-desired way of warming our homes and cooking our food. Tacoma's electric domestic heating is on a paying basis. Seattle sees this, and is going in for the same service on a big scale. One year from today Seattle will be warming the house by pressing the button.

"The lugging, the lifting, the laying incident to the use of coal and wood; the chips, and ashes and soot, the coal dust, the greasy smoke that penetrates to the remotest corners of the house, soils and spoils curtains, carpets, clothing and upholstery, smuts the walls and furniture and compels costly cleaning and repainting; the furnace gas that kills the flowers and perchance the whole family—none of these accompany electric heat, light and cooking.

"West Coast weather demands heat in the house only at certain hours of the day. We fire up the furnace for the morning, then throw open the doors to cool off when the day warms up. We fire up in the evening, then throw open the windows when we go to bed. Thus we waste a large proportion of our wood and coal heat.

"Not so with electricity. We switch it on or off in small or large units to fit the need. We use only as much as we need. We can practice close economy on electricity. We have learned how to do that with our electric lights. Let the wood and coal supply wane as it will, our mountain water never ceases to fall and never grows less from year to year. Twenty years from now electric heating in the cities of the West Coast will be as common as electric lighting now is. Long before that time it will be common in Tacoma and Seattle. Will it be so in Portland? Not if we wait for somebody to bring it for us. Tacoma and Seattle are going after it as municipalities, and they are sure to have it at a price that will put it into every home."

Mr. Graf's letter of reply is as follows:

"On November 24 there appeared in the editorial section of the Portland Telegram an article on the heating of homes by electricity. This article was called to my attention in connection with our study of fuels in the materials laboratory, of which I have charge, at the Oregon Agricultural College. In our comparison of various fuels the use of electrical energy for heating has also been considered and your article, therefore, has caused some very interesting discussion.

"We have available the latest report of the light department of the city of Tacoma, from which your data were taken, a bulletin on electric heating of residences by the University of Washington engineering experiment station, the record of the testimony and exhibits and the opinion on same in the matter of the investigation of electric service for

open air heating made by the public utilities commission of the state of Idaho.

"Various other technical articles and abstracts have also been considered and our conclusions are that the questions put by your editorial cannot be answered in the affirmative; at any rate, not without qualifying statements. Most readers, without understanding fully the conditions and the engineering and economic questions involved, will assume from the optimistic tone of your discussion that the general heating of homes by electricity is indeed at hand.

"First, I am going to quote from the Opinion on Electric Heating, Oct. 17, 1919, by the public utilities commission of Idaho:

"Electric heating is, from an economic standpoint, a sort of alchemist's dream. We all know that electricity does produce heat, and we all realize and appreciate what a wonderful thing it would be to dispose of our coal piles and ash pits and smoke, dust and cinders, and would, therefore, fain think it practicable. But a most cursory study of the subject, either from the standpoint of thermal dynamics or social or economic science shows that it is utterly impossible."

"In the minds of many people the word 'electric' is very closely associated with magic, whereas nothing is farther from the truth. To produce a unit of electrical energy requires in each case certain definite equipment involving first cost with inevitable investment charges and depreciation, to say nothing of ordinary operating expenses. Hydroelectric power does not necessarily, or even ordinarily, mean cheap power. The cost of the Tacoma municipal plant (pre-war mostly) according to their report was very close to \$3,400,000. The power distributed during 1921 amounted to about 75,400,000 kw-hr. If this had all been sold at 1½ cent per kw-hr., that is at the heating rate, the income would have been \$377,000, or several thousand dollars short of their ordinary operating expenses.

"I understand of course, that the heating business in Tacoma has been handled by so-called surplus power; that is, power which was available due to building the plant larger (in 1912) than necessary for immediate needs.

"It appears (Page 25, Information Book, Light Department, City of Tacoma), that this surplus power is now exhausted. I will quote the paragraph in question:

"The heating load was originally intended to be supplied from the surplus water power development at the Nisqually plant, but today this surplus is exhausted so that since January 1 of this year new heating business has been refused until the Lake Cushman plant is completed, or some inter-tie arrangement is made to make it possible to buy the power at a cost as cheap as the selling price."

"The heating business is not generally a desirable load for electric plants for the reason that the seasonal peak for this class of service comes at the same time of year as the lighting peak. If any considerable amount of heating business is carried and the plant is fairly well loaded it means that, to all intents and purposes, additional capacity must be provided to carry the heating load. Now then, on the average it costs between \$200 to \$300 per kilowatt capacity for a complete hydroelectric installation, including everything up to the consumer's house.

"This means that in order to heat the average house of six rooms, allowing two kw. per room and an over all efficiency of 75 per cent for the plant and distribution system, there will be required 16 kw. of plant capacity. This involves an average capital expenditure of \$4,000. Taking the minimum charges, as in force at Tacoma, the return on this investment would be \$108 per year, or 2.7 per cent to cover all costs including interest, taxes, depreciation, maintenance, operation, etc. It is very evident that no municipality, or much less, any privately owned company, could do business on this basis.

"To indefinitely carry a deficiency due to heating load, which is not supplied by current from surplus capacity, is not justifiable from any standpoint. It means that the man who operates motors, or uses lights must help pay for heating his neighbor's house.

"The economic absurdity of installing plant capacity primarily for heating is thus plainly evident. Cases where surplus power is available will, of course, exist from time to time. In such cases as in Tacoma it may be feasible and expedient to sell the power for heating but this can be considered only temporary. When the lighting and power demand increases to the plant capacity the electric heating load will become an actual disadvantage and source of loss to the electric company because the current cannot be produced at a cost low enough to compete with solid and other fuels at present, even in this territory where fuels are very costly.

"Even at one-half cent per kw-hr. electric heating for the same amount of heat will cost from 25 to 50 per cent more than other fuels. Take for example the average six-room house, as before mentioned. The minimum electric heating cost for this with two kw. per room will be \$108 per year (Tacoma rates). At one-half cent per kw-hr. this will buy 21,600 kw-hr. One kw-hr. is equal to 3,412 B.t.u. Therefore, the \$108 will buy 73,700,000 B.t.u. To supply this with \$12 coal (assuming 12,000 B.t.u. per pound and 45 per cent furnace efficiency) will cost \$82; with soft wood at \$8 per cord, about \$62.

"Your editorial stated that the average electrically heated home in Tacoma uses each year about \$80 worth of heat, but the University of Washington engineering experiment station bulletin No. 15, above referred to, tabulates in detail the various classes of users and discloses the fact that this average includes a good many homes in which there is auxiliary heat in the shape of wood ranges, heaters and fireplaces. Anyone assuming that an average sized home is being heated electrically at this small cost will find that he is mistaken.

"S. H. GRAF.

"Dated Dec. 6, 1922."

Unfortunately my recollection is that the Journal of Electricity and Western Industry has given some backing to the idea of the practicability of electric house heating, perhaps more in connection with such applications in California than elsewhere, but nevertheless, as I remember it, there have been no articles to discourage this idea.

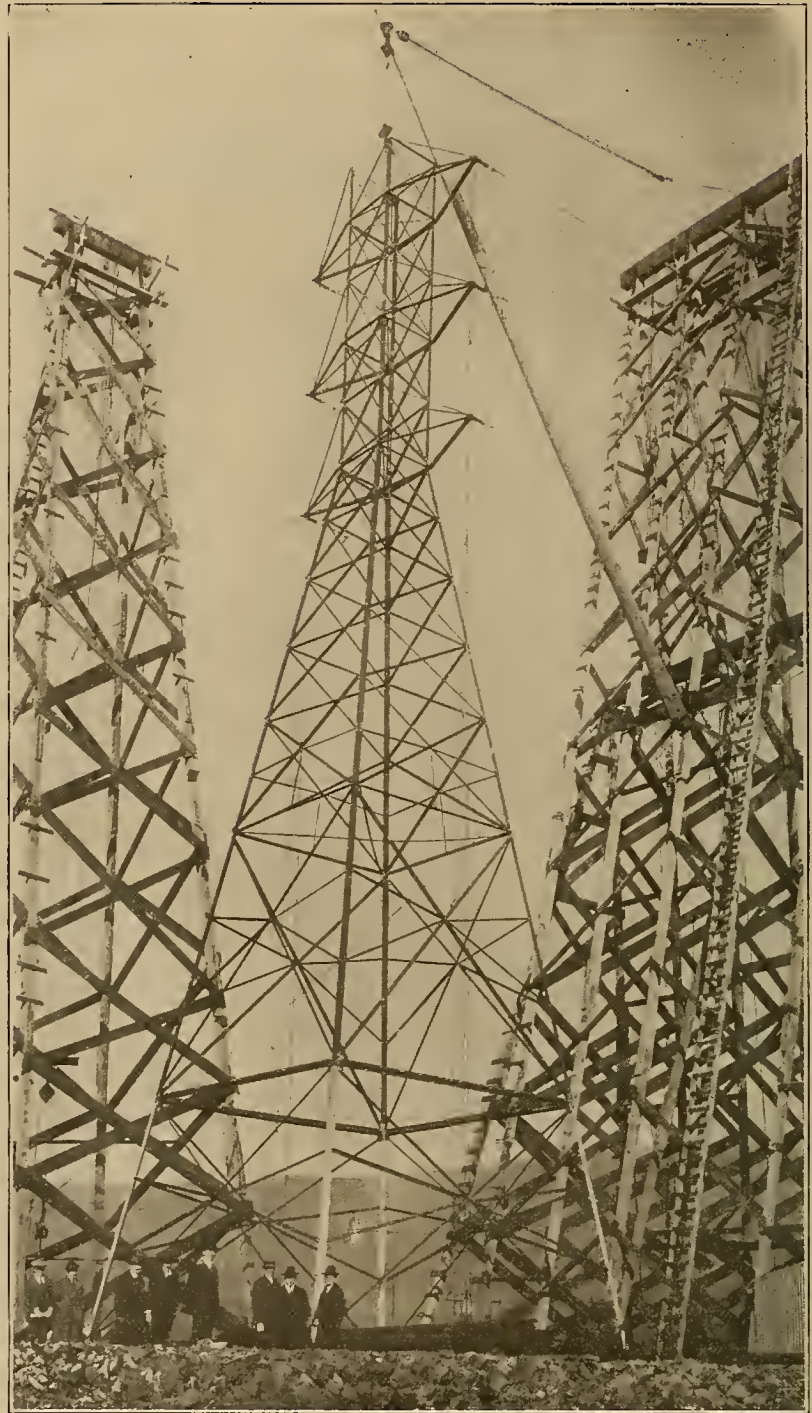
A. C. McMICKEN,
Sales Manager,

Portland Railway Light & Power Company.
Portland, Ore.,
Dec. 18, 1922.

Proving the Margin of Safety for Western Transmission Lines

HIGH tension transmission towers carrying immense blocks of hydroelectric power at record voltages from the mountains to the agricultural and industrial centers of the

West must have adequate strength to withstand every possible condition of load strain. Each type of tower must have a generous margin of surplus strength beyond the requirements of all actual loads under all conditions of wind and weather. The illustration shows a test on the dead-end and angle type tower to be used on the new Kings River line of the San Joaquin Light & Power Corporation. A combined horizontal pull of 44,900 lb. is being exerted on the crossarms with 12,600 lb. vertical load. The test was conducted at the South San Francisco plant of the Pacific Coast Steel Company whose shops have turned out towers for several of the West's highest voltage lines.





Changing Miner's Inches to Kilowatt Hours

By George C. Tenney

HOW the Western States Gas and Electric Company is reconstructing a ditch, originally built by California Forty-Niners for placer mining purposes, in the development of 27,000 horsepower of electrical energy.

SIXTY years ago when mining was the chief industry in California, a group of mining men with the intention of operating on a large scale, constructed the El Dorado Ditch along the canyon walls of the South Fork of the American River in order to have sufficient water for their placer mines. Since that time the placer mines have been abandoned, but the ditch has been continued in use, first to supply the town of Placerville and later to irrigate the farms in the valley below. Within the next twelve months, this ditch, rebuilt and enlarged, will discharge its water into the penstocks of the American River plant of the Western States Gas & Electric Company, generating 26,800 hp. of electric energy for use in mines, factories and homes. The construction project, which includes the creation of a series of immense storage reservoirs in the high Sierras, the rebuilding of the historic ditch and the erection of a hydroelectric plant above Placerville, involves the expenditure of \$5,000,000.

The Western States Gas & Electric Company, a subsidiary of the Byllesby Engineering and Management Corporation, was incorporated in 1910. It was a consolidation of the properties of the Stockton Gas & Electric Company, the American River Electric Corporation, the Richmond Lighting Corporation, the Humboldt Gas & Electric Company, the Eureka Lighting Company, the Arcada Lighting Company, the Ferndale Electric Lighting Company and the Fortuna Lighting Company, all in California. The total annual gross earnings of the entire group

of small utilities did not exceed \$750,000 at the time of consolidation but during the past twelve years the business of the company has increased to such an extent that for the year ending Dec. 31, 1922, the gross earnings will exceed \$2,700,000.

The company consists of three divisions. The Stockton division, which is the most important, comprises El Dorado, Amador and Calaveras coun-

ties and portions of Sacramento and San Joaquin counties. Approximately 70 per cent of the company's load is in this district. The Richmond division comprises the city of Richmond and adjacent industrial territory. The Eureka division includes Trinity and Humboldt counties.

Power is supplied to the Stockton division from a hydroelectric plant with a capacity of 8,100 hp. on the South Fork of the American River and from a steam plant in the city of Stockton. The company also operates a steam plant in the city of Eureka. So heavy is the demand for power in the districts served that the bill for power purchased from other California utilities for distribution over the lines of the Western States Gas & Electric Company exceeds \$400,000 annually. It is in order to eliminate the necessity for purchasing power and to insure its consumers sufficient power to meet their future needs that the American River project has been undertaken.

Diversified Character of the Load

Few utilities have as diversified load as the Western States Gas & Electric Company. Electric

energy is supplied for the operation of lime quarries, quartz mines and gold dredges in the mining district. In addition to its lighting load, urban and interurban traction companies purchase power from the company and fully 20,000 hp. in electric motors for irrigating farms in the San Joaquin valley is connected to the company's lines. Included among the industrial users of power in the Stockton division are brick yards, electric furnaces, tanneries, two tractor factories, flour mills and box factories. Power is also sold wholesale to the city of Lodi for



Guniting the core wall of the Twin Lakes dam. Caterpillar tractors are used to pull trains of three LaPlante-Choate wagons and to haul a grader to level dirt. The steam roller packs the soil after it is graded.

distribution. Considerable encouragement has been given to electric cooking, especially in the rural districts, there being at the present time 233 electric ranges connected to the lines. These, together with the water heaters which have been almost universally installed in the farm homes along with the ranges, comprise a connected load of approximately 1,500 kw., the revenue from which averages \$1 per kilowatt of connected load per month, a remarkable record for this type of installation.

The following is a tabulation of the number of consumers in the Stockton division:

| | |
|-------------------------------|--------|
| Lighting | 15,538 |
| Power | 3,213 |
| Ranges and water heaters..... | 233 |
| Commercial power | 946 |
| Irrigation | 2,034 |

American River Development Program

The program of development under way on the American River at the present time includes essentially the following:

1—Construction of a new power house in the canyon of the South Fork of the American River, about 14 miles above Placerville. Two units of 10,000 kw., or 26,800 hp., are to be installed. Ultimate development to be 8 units, or approximately 100,000 hp.

2—Enlarging and lining of the 23 miles of El Dorado ditch, from the forebay above the new power house to the intake on the American River, near Kyburz, just below the mouth of Silver Fork of American River, which carries the water from Silver Lake and Twin Lakes.

3—Construction of penstocks. The water wheels in the power houses will operate under a 1,900-ft. head.

4—Construction of a 45-ft. main dam and 26-ft. auxiliary dam at Twin Lakes to create a storage of 16,000 acre-ft.

5—Construction of a diverting dam in the South Fork of American River at head of El Dorado ditch just below Kyburz.

6—Construction of a double transmission line to connect new plant with present transmission system.

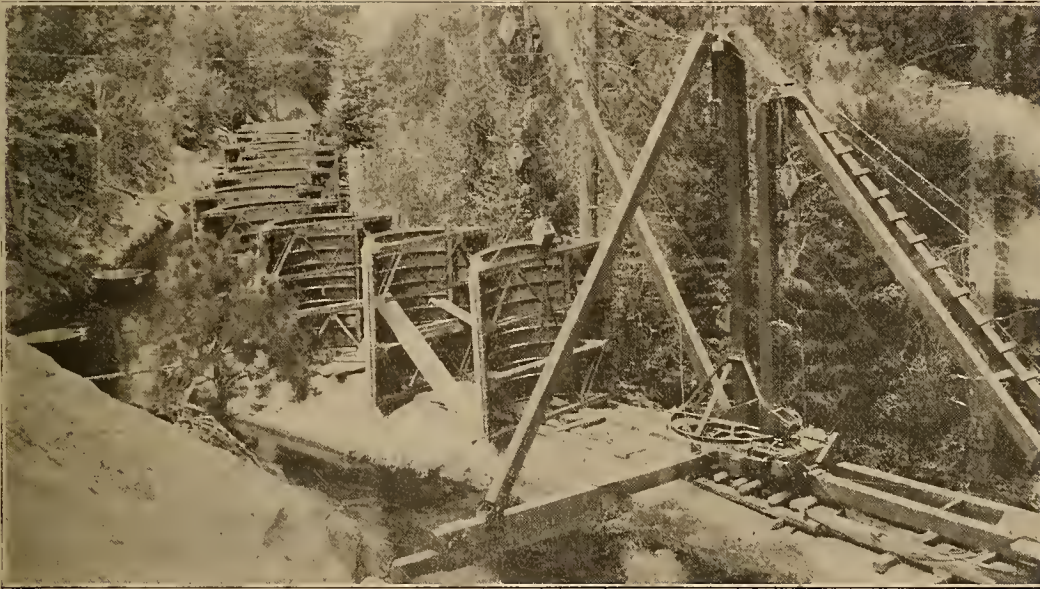
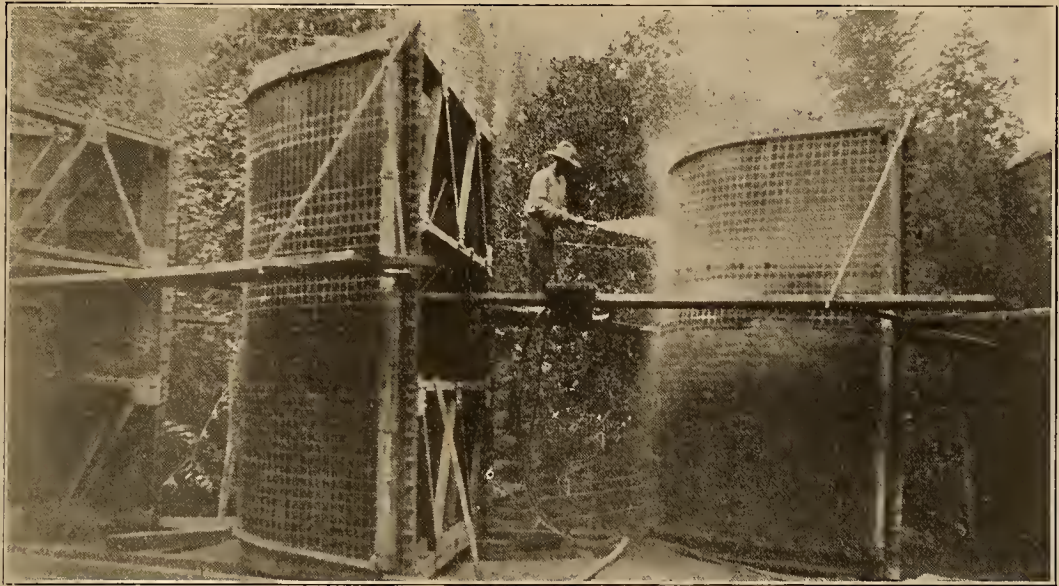
The potential storage which it is proposed to develop is about 93,000 acre-ft. in six reservoirs, some of which are already existent. The program is as follows:

(a)—Twin Lakes: Present, 16,000 acre-ft (after completion of dam under construction); ultimate, 25,000 acre-ft.



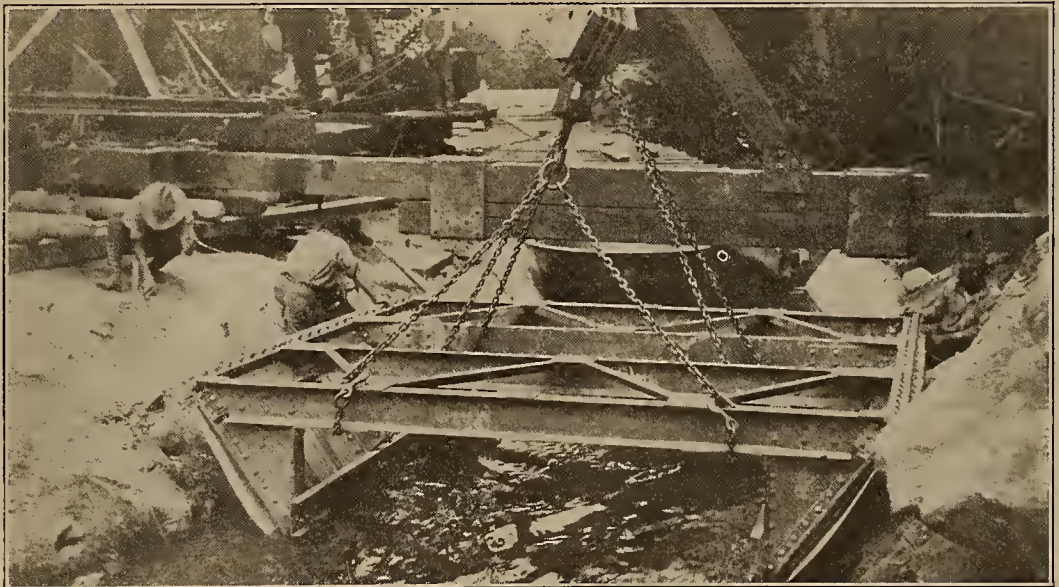
A closeup of the details of the rip-rap or wood panel lining is shown on the left. The panels are made of 12-in. boards and are 6 ft. wide. They overlap and are held in place by pipe driven into the bottom of the canal. On the right is a completed section which has been concrete lined. Seams between slabs will be closed with guniting when the ditch is unwatered. Note the material tubs shown in the ditch.

Concrete being placed upon the steel forms by use of the gunite machine



Showing derrick for lowering the steel forms holding concrete slab

Lowering precast reinforced concrete slab in the El Dorado ditch



(b)—Silver Lake: Present, 5,400 acre-ft.; ultimate, 25,000 acre-ft.

(c)—Echo Lake: Present, 2,000 acre-ft.; ultimate, 2,000 acre-ft.

(d)—Medley Lakes: Present, 5,000 acre-ft.; ultimate, 10,000 acre-ft.

(e)—Alder Creek reservoir: Present, 5,000 acre-ft.; ultimate, 25,000 acre-ft.

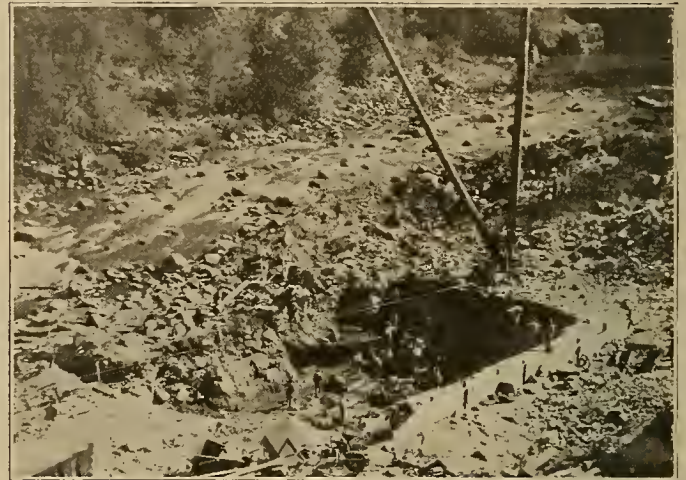
(f)—Plum Creek reservoir: Present, none; ultimate, 6,000 acre-ft.

Chief among the engineering difficulties which have been encountered has been the reconstruction of the El Dorado ditch to eliminate leakage, which has averaged one per cent per mile, and to do away with the formation of ice in the ditch during the winter months. This has been solved in a novel manner. The contract which was entered into with the El Dorado Water Company at the time the ditch was purchased called for the delivery of 40 sec.-ft. of water from May 15 to Oct. 15 for irrigation purposes; and 6 sec.-ft. during the remainder of the year for domestic use in the city of Placerville.

Laying Concrete Under Water

Consequently all construction work on the ditch has been done without shutting off the water. In places where the greatest leakage occurred the ditch has been concrete lined. Steel forms have been built on which the reinforcing material has been stretched. These forms are covered with concrete by means of the gunite process. They are then carried down the ditch to the place where the concrete is to be laid. The forms are lowered into the ditch to the proper level, the intervening space is filled with sand and the steel form covered. The joints between the concrete sections will be filled with concrete during the winter months when the water can be shut off for four days each week. The steel forms are then returned to the base of operations in a specially built steel boat, where they are again covered with concrete. In sections where the leakage is not excessive the ditch walls have been lined with wooden panels joined together with sections of pipe. The entire ditch will be concrete lined at a later date.

Although a portion of the main state highway to Lake Tahoe parallels the American River, the transportation problem incident to reconstructing the ditch has been a difficult one. The difficulties were overcome in a novel manner. Supplies are carried in motor trucks to the intake of the ditch near Kyburz, where they are placed in tub-like steel boats and floated down the ditch to the point where they are to be used. The boats require no attention as they are carried along by the force of the current. When emptied the boats are floated to a point where the ditch again meets the highway, and are there removed, stacked on motor trucks and hauled back



Excavation for the foundation of the power house on the bed of the South Fork of the American River

to the intake. Transportation costs have been cut from 25 cents a ton-mile to 2.5 cents by the use of these boats.

From Forebay to Power House

Water from the ditch will empty into a forebay having a storage capacity of 1,200 acre-ft. of water, a quantity sufficient to run the turbines 48 hours should an accident occur which would require the shutting off of the water at the intake. The ditch



The headquarters camp and office of the El Dorado development early in December. Climatic conditions are such that construction can only be carried on for a few months during the summer. On the right is seen the conduit through the Twin Lakes dam. Note the excavations from which the dirt used in the construction of the dam is being removed.

will have a capacity of 120 sec.-ft. of water. Its construction has been such that it may be increased to 350 sec.-ft. by the addition of a concrete shoulder when the demand for power requires the installation of additional units at the plant on the American River. From the forebay a two and a half-mile pipe line will carry the water to the surge chamber at the head of the penstocks. The pipe line grade extends along cliffs of solid granite which necessitated the use at one point of a charge of 14,375 lb. of powder to blow away the projecting rock. From the surge chamber the penstocks, which have an initial diameter of 52 in. and a final diameter of 30 in., drop 1,900 ft. to the power house. To facilitate the handling of material along the penstock line, a tramway is being constructed parallel to the penstock.

The site of the power house has been connected with the outside world by the construction of three miles of road down the canyon wall. In many places the grade exceeds ten per cent. Roads have also been constructed to the various reservoir sites.

From the power plant, a 110,000-volt steel tower transmission line is to be built to connect the plant with the present transmission loop of the company. The timber has been cleared from the right-of-way

and a 60,000-volt temporary line constructed to furnish power for the construction work.

Work at the various reservoirs and on the ditch can only be carried on for a few months during the year by reason of heavy snowfall during the winter. Consequently during the summer months the working day is 24 hours long. Through the aid of powerful electric lights steam shovels load rock and gravel into dump wagons day and night for the construction of the dam at Twin Lakes.

At the present time work on the project has been fifty per cent completed and the company expects to place the plant in operation during December, 1923.

In the terms of energy the development will add 20,000 kw. to the interconnected power system of the Pacific Coast. In terms of the benefits which will accrue it means the conservation of one of Nature's great resources to serve a beneficent purpose—the harnessing of vast quantities of water which, when converted to electrical energy will run factories, light homes, streets and stores, pump water for irrigating farms and operate countless labor-saving and comfort-bringing devices in homes and offices.

The Electrical Dealer's Problem

By C. Wilbur Fritz*

WERE one to look over the financial statement of the average electrical dealer, particularly one specializing in household appliances, such as washing machines, etc., he would find a very large part of the dealer's assets to be in Contracts Receivable and an excessive item of Bills Payable among his liabilities, and the more merchandise he sells, the larger become both items. This condition, temporarily, need cause the dealer no great amount of worry, providing he takes the necessary steps to overcome it. It can easily be overcome through a proven satisfactory method of finance.

There is an element in the statement that is vital to the dealer's success and which does not appear on the face of the statement and that is, the ratio of delinquencies in that Contract Receivable account among his assets, for every 30-day delinquency in that account, reduces by just so much the jobber's possibility of obtaining 100 cents on the dollar on his account included in that Bills Payable item among the Liabilities. Every 30-day delinquency reduces the profit on that sale by just so much and a 60-day or 90-day delinquency may change that profit into a loss.

Determine Rate of Turnover First

Every merchant in any business must figure the turnover which he can obtain and base his profits accordingly. A dealer, for example, may buy on a 40 per cent discount basis, and operate on an overhead of 30 per cent, figuring he will net 10 per cent profit or \$10 on each \$100 transaction and allow that

on that basis, he can extend credit with his amount of capital, for 60 days on open accounts. Suppose, for instance, that instead of collecting that \$100 due him at the end of 60 days, he doesn't collect it for another 60 days, thereby making a total of 120 days credit extension. Has the transaction then been profitable to him? No, for had his bill been paid when due, he would have gotten another turnover on the same \$100 and made an additional \$10 which through lack of receipt of the funds due him, he was unable to do, thereby losing the second profit which offset the first and probably caused him to lose an additional cash discount, which with proper turnover he could have taken, so instead of actually profiting by such a transaction, he has lost money. The same theory is applicable to the instalment business and every time a 30-day delinquency exists, a certain proportion of the profit has vanished.

In addition to the loss of profit by delinquencies there is the ever growing risk of ultimate loss, for the greater the delinquency, the more probable the loss.

Another item to be taken into consideration is the stock of merchandise carried. I have submitted to me statement after statement with an inventory of 40 to 50 per cent of the total yearly volume of business. Stop and analyze, if you will, a dealer carrying a 50 per cent inventory of his yearly volume. Manifestly, he is getting two turnovers a year on merchandise and if to get a turnover he must extend a year's credit, unless his discounts are exceedingly large and his operating cost proportionately low, he

*District Manager, Republic Finance & Investment Co., San Francisco.

isn't apt to make government interest rates on his capital employed and might far better have his capital invested in government bonds.

The Duties of the Credit Man

I believe the credit man of any organization should carefully watch these various items. Personally I make it my business to occasionally check the Contract Receivable and open account ledgers of our clients to make certain that they are getting their proper ratio of collections to outstanding accounts, for it is certain that if they do not collect the money due them, they can never take care of their obligations to others.

The corrective measures are apparent and a simple set of rules would be:

1. **Fix the amount of turnover you must obtain** and keep your inventory to a minimum to get that turnover.

2. **Collect your open and instalment accounts when due.**

Send statements out promptly. If remittances do not come in, use your telephone, and if they still don't come in, go out after them. Be persistent, and don't feel that you will make an enemy of a customer by asking for money when due. If that is the kind he is, you had better get him off your books as soon as possible, for he will surely cause you a loss sooner or later.

3. **Pay your own bills promptly.**

4. **Base your overhead on your present volume of business.**

Don't attempt to set the volume of business to meet your present overhead.

For some time I have been of the opinion that an auditor (and a business man) employed by a group of jobbers, would pay for himself many times over by the saving to the jobbers of the many thousands of dollars which they now charge off as losses, as most of these losses are due, in a great measure, to the over extension of credit by the jobbers themselves. Were a man employed to investigate any dealer who failed to take his cash discount after having once formed that habit and to assist any others who may be in need of instruction along sound business principles, the losses would be far less. I believe every dealer would welcome such assistance and even be willing to pay his pro rata share of the expense.

The backbone of any industry is its credit and the only method of keeping the industry sound and healthy, is to keep its credit structure in the same condition and that stage can never be reached until the most vital element—the direct contact with the public—the electrical dealer and contractor, is educated to the point where he can keep his unit of that credit structure sound and healthy.

The contractor's problems are two-fold; to learn to figure a job properly to make a profit, and to learn how to collect his money when due.

With the dealer, we have a more complex problem. He must maintain an organization of appliance

salesmen. He must also maintain a delivery and repair department for merchandise sold. He must have a credit department for the checking and verification of all sales made. A collection department must also be maintained, as 85 to 90 per cent of all sales made will be on an instalment basis. And having purchased a bill of goods and through his energies, sold all of it during the month, his next problem will be to figure out how he can pay for a like amount of merchandise for the second month's business.

Presumably he had the cash to pay for his first order, but now he has paid a lot of salesmen's commissions, delivery expense, and advertising—and all he has left is a number of lease contracts—promises to pay. His bank can't handle them because they run for a period of ten months or more and their credit extensions are for a period of 90 days or less, and the dealer cannot repay them on any loan they might make on his contracts in less time than the contracts themselves pay out.

The Function of the Finance Company

However, he can do one of two things—first (the wrong thing), ask extension of time from his jobber on his second bill of goods, or, secondly (the right thing), make proper arrangements with a legitimate finance company for the sale of his contracts to them, providing, however, that he amply assures himself of his ability to make repayment to them out of collections received on his contracts. This means that under no circumstances, should he agree to pay back 100 per cent of his collections, for experience has shown there is no dealer who can collect 100 per cent of the amounts due him. To agree to repay an amount which he knows he will not receive is merely courting disaster.

Having made proper arrangements with a finance company, he sells his contracts to them and receives in cash from them his advance, which should not exceed 80 per cent based on the safety factor from the dealer's standpoint, and he uses these funds for discounting his second bill of goods. The charges made by the finance company have been added to the sales price of the merchandise sold, so the dealer's regular profit is obtained, he has taken his 2 per cent cash discount in 10 days, which amounts to 36 per cent per annum on a 2-10 net 30 basis. If he has not had advanced more than 80 per cent on his contracts and need not repay to the finance company over 80 per cent of the amount of collections due him, he has a factor of safety at work which will eliminate any possible worries and his main efforts can be devoted to seeing how near he can make his collections reach 100 per cent.

Were every dealer to conscientiously follow out these methods of operating his business, and carefully watch every detail, more would show a substantial profit at the end of the year. **The electrical appliance business is a most profitable one** and in addition, a very interesting one, as many can vouch for who have systematically carried it through on proper business lines.



A TRIAL installation of G-E Novalux highway lighting units was made along Santa Rosa road, shown in the accompanying views. The lighting units were placed 28 feet above the road and 540 feet apart. Poles in front of the homes fronting the road were deemed objectionable, and heavy cables stretching across it were in disfavor. The adaptability of the unit chosen made it suitable to these conditions and they were suspended in a center span arrangement from inconspicuous wires strung high overhead. So successful was this installation that a lighting district was established covering about four square miles, containing 270 lighting units.

WHEN the lights of Altadena's new street lighting equipment were turned on, during December, one of the most interesting installations of the kind yet made began operation.

The lighting problem presented was unusual. Altadena is a suburb of Pasadena, situated at the base of the Sierra Madre mountains in California. The district comprises about four square miles and consists of country estates. The thoroughfares are in reality highways rather than streets in the ordinary sense. The residents, while desiring the illumination of these thoroughfares, did not want ordinary street lighting units employed.



Another View of Cooperative Selling

By J. E. Bullard

Cooperation between electrical dealers and a well known furniture establishment was exemplified during the June Bride Week held last year under the auspices of the California Electrical Cooperative Campaign. A window in the John Breuner store in Oakland was used to display electrical ware which was to be given as wedding presents to the principals in a "Radio Wedding," one of the features of June Bride Week.



WHEN one speaks of cooperative selling he thinks of an association of competitors who join hands in a combined effort to increase the sales of all. One rarely talks upon the subject very long, even though he lives on the Atlantic Coast, without mentioning California oranges, raisins, walnuts, Oregon apples, and all the other various agricultural products raised in the West and made household words throughout the nation.

This, however, is not the only form of cooperative selling that is being done successfully. More and more we are seeing such combined effort as is indicated when on the billboards appear such phrases as "Mallinson—famous maker of sport silks, says 'wash silks with Lux!'"

One company may be paying for the billboard but two well and very favorably known concerns are lending their prestige to making sales. This cooperation results in a sales value often worth more to each of these concerns in non-competing fields than would be the case if the two names were not combined.

If the plan is properly worked out the result may be a sales energy worth more than twice as much to each of the two concerns than independent selling would be worth. Central stations have made use of this idea to a certain extent by lending the use of their windows to the dealers in the town. The dealer would be allowed to make a display of his goods in the window. A card prominently displayed states just which dealer is making this display. Other cards may call attention to the good window lighting.

The dealer sells more goods as a result of this window display and the central station sells more window lighting as a result of this demonstration, if the idea can be carried out in a satisfactory manner. If the city is not so large that window space cannot be given to all the dealers who desire it, this form of cooperation often results in a much quicker introduction of new ideas in window lighting than would be the case under other circumstances.

However, when this idea is given careful consideration, it is discovered that it takes on more of the form of a demonstration than of actual cooperation. The central station fully expects to sell window lighting to the dealer to whom the window is loaned. If the results of the window lighting appeal to the dealer, he is placed more or less under obligations to buy that kind of lighting.

Last summer a stationer in one of our larger cities staged a cooperative selling stunt that was really cooperative. This stationer arranged with the telephone company to make a window display featuring toll calls and to have in the store a man at an information desk who would explain to the people who came in just how and the best way to make these calls. A card in the window invited those looking at the display to come in for the free information.

To make it still more worth while for the telephone company, this stationer distributed to 5,000 of his out-of-town customers, coupon books. Each book contained 25 coupons, each good for one toll call from anywhere to the stationer. This naturally created a greater interest in toll calls and brought business directly to the telephone company. As it

worked out, however, these coupons brought enough business to the stationer to make the coupons a good advertising investment.

In addition to this, the stationer had near the information desk a display of all the articles he sold which could be used in connection with the telephone. These included memorandum pads, telephone brackets, card directories and numerous other items.

The display in the window and the invitation to come inside for more information brought a great many into the store who would not have come in had the stationer made the display of his own goods. When they were once inside the display tempted them to make purchases.

This display and cooperative effort worked out so well that it was tried soon after with another concern. It is now being made a regular feature of business getting effort on the part of this company.

In the case of the telephone company it so happened that it was a good customer of the stationer and the stationer was a good customer of the telephone company. It was the case of one good customer helping another. In the case of other plans along this same line of cooperation, however, concerns neither buying from nor selling to the stationer will cooperate in a business building effort.

It will be noted that in these plans each party to the cooperative effort gives about an equal amount of time, money and attention to the plan. In some instances it has been a case of combining a selling plan the stationer has found successful, with one the company cooperating with it has found successful. In short, two selling efforts that have been found by experience to be very effective are harnessed together. The result of this team work seems to approximate a doubling of the effectiveness of the plan in the case of each concern. That is, each party secures about twice the sales returns he would if working independently.

One important point in this plan as worked out by the stationer is that each party to the plan must be well established, very favorably known and a rather extensive advertiser. The stationer who conceived the plan believes thoroughly in advertising and has built up his business very largely through the skillful use of the printed word. He considers cooperation only with those concerns which are as well and as favorably known to their customers as he is to his.

The success that has attended his effort indicates to how great lengths it may be possible to carry the plan. When dealers cooperate with each other it is quite obvious that they are doing it for their own interests. No matter how much is done or said, it is not an easy matter to make the people believe that they are being given first consideration.

As an example, the electric appliance dealer doesn't sell silk, but suppose that he arranges for a demonstration of the right way to wash silk with some soap manufacturer or some silk manufacturer. Electrical appliances enter into the demonstration. Each manufacturer has built up a prestige that has caused people to have a great deal of confidence in

him. Many people who would not enter the store if the dealer relied solely upon his own prestige, will do so because of the prestige of the manufacturer.

When they come in to see the demonstration, they see just how electrical appliances can be used in the process of washing silk, or in using that particular soap. They are more impressed with the silk or the soap than they otherwise would be—and at the same time the electrical appliances are being demonstrated to them. A double sales effort is the result at the expense of less than one.

But let us go still farther and consider a manufacturer of beds, for example. The dealer doesn't sell beds and apparently has no interest in them. However, this manufacturer has advertised them extensively; his name is well and favorably known. He can make a window display that will attract people to the store. He has something to say about beds that people want to learn. The display is made in the window and the man or woman who is to give the special information is stationed inside the store.

Near this information desk there is a display of lamps that can be attached to a bed, and there are also heating pads, room heaters and various other things that can be used in the bed room. If the plan is properly worked out it can be seen that such a scheme would work to the advantage of both parties.

In the case of these two examples, the objection may be made that the manufacturers have dealers in town, who are selling their products and that these dealers would want the demonstration made in their stores. This may be true and again it may happen that there are so many dealers, many of them very small, that it would not be possible to make a satisfactory demonstration in each store, while if any partiality was shown other dealers would feel slighted and would be inclined to sell as little of the product as possible.

The suggestions made, however, have been made merely to point out the possibilities. None of the suggestions might prove feasible to carry out as they have been set down. Nevertheless they may lead to ideas that prove of real business building value. The real object is to work out something new along this line.

October Electrical Exports From United States

Preliminary figures for October show electrical exports from the United States continuing in volume about equal to that of the previous month. The total value, amounting to \$5,123,471, compared favorably with October, 1921, when \$5,371,030 worth of electrical goods were shipped.

Gains over September are noted in exports of both heavy apparatus and supply lines, although in general power-apparatus exports fell off and exports of signal and communicating appliance correspondingly increased. As compared with September, October shipments of direct-current generators over 500 kilowatts increased by \$29,000, and alternating-current machines over 2,000 kilowatts gained to the extent of \$141,000.

ELECTRICITY IN INDUSTRY



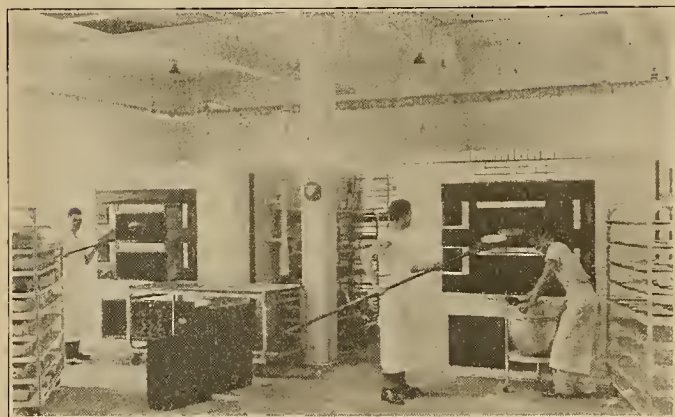
By Louis F. Leurey
Industrial Electrical Engineer

Marines Keep Bakery Clean Through Use of Electricity

THE accompanying photograph shows to what a splendid degree the application of electricity promotes cleanliness, light, and efficiency in the modern bakery. Many of us remember the older order of things where the smaller bakeries especially were poorly lighted and ventilated and the unhealthy conditions were reflected in the pasty appearance of many of the operators who followed this trade.

A pleasant contrast is shown in the appearance of the young "Devil Dogs" who are feeding two electric ovens in the new Marine Base at San Diego, Calif.

The baking for all the men is done at a model bakery having a capacity of 1,200 loaves per day. Flour is dumped into a giant hopper where it is sifted



Two electric ovens installed in the bakery of the United States Marine Corps base at San Diego, Calif.

to remove any possible foreign matter that it might contain. The flour then passes to the mixer where it is automatically weighed, measured, mixed and heated to the required temperature. After the dough has raised for about six hours, it is cut to the required size, kneaded and dumped into the pans by machines.

This bakery is equipped with two electric ovens, each having a capacity of 240 one-lb. loaves of bread, and consuming a maximum of 35 kw. The ovens are of the stationary type, built of brick under the supervision of the manufacturer. They are equipped with steam connections and mercurial thermometers, so that the temperature can be accurately gaged and

the heating elements are above and below each deck. The whole shelf is used efficiently because of the wide doors. The three-heat control switches enable the operator to control perfectly the baking temperature. The appearance of the glazed white brick of the oven exterior is in keeping with the quality of the product of the oven. As there is no combustion, flame, fumes or soot, this type of equipment is indeed ideal for the model bakery.

Heavy Draft Horses Are For Rent at Sixteen Cents a Day

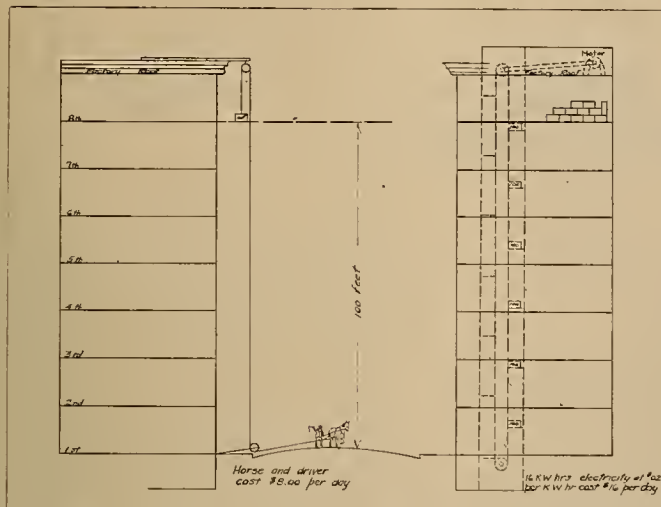
ONE of the first things the inventors of the steam engine set out to do was to find some simple and familiar measure by which the power of their newly discovered mechanical agent could be translated into every day understandable terms. They immediately began experiments with heavy English draft horses, which were at that time, the most powerful available sources for doing heavy mechanical work.

It was found that very heavy animals of this type could work at an average rate which would raise a weight of 33,000 lb. through a distance of one foot in one minute, and this rate of work, namely, 33,000 foot-pounds per minute, was called one horse power. The ordinary layman could then easily grasp the mighty power of the steam engine when told that it would do the work of twenty horses or fifty horses.

The early pioneers in the electrical industry were not so fortunate in selecting their units of measure, as in this case the units were selected purely for their scientific value and for their similarity to the general form of the metric system. While the early inventors could not possibly have foreseen this condition, their selection of units of measurement has led in modern times to a most unfortunate state of affairs under which millions of every day citizens are purchasing electricity in the form of kilowatt-hours without having any conception of the magnitude of power which they are purchasing for such a nominal sum.

The electric meter today is probably the most dependable form of measuring device in the whole commercial field, as it measures with astounding accuracy varying amounts of power from the energy of only one incandescent lamp to the output of a 100,000-kw. power plant. No commodity in commer-

cial life today, is more exact in magnitude and more accurate in measurement than the kilowatt-hour of electricity sold to the householder and to the factory, and yet there is no commodity about which so much misconception rests in the minds of the purchaser.



The horse and driver pictured at the left cost the factory owner about \$8 a day to do the same work that the electric escalator at the right will do for \$0.16 worth of electricity.

In the ordinary induction motor an input of one kilowatt into the electrical windings of the motor will produce at the pulley, the power to do a horsepower of work. If this energy is employed continuously in the motor for a period of one hour it will then represent to the purchaser the amount of energy equal to one kilowatt-hour for which he pays approximately two cents and which does for him during that hour an amount of physical work which could only be equaled by that of a very heavy draft horse.

As an illustration, let us suppose that a manufacturer had a number of 100-lb. bales of goods to

lift to his eighth floor which is 100 ft. above the street level. A very heavy draft horse working to his full capacity could lift 200 of these bales per hour, or 1,600 in an eight-hour day, at a cost which would probably not be under \$8 per day for the rent of the horse and wages of the driver. This same exact amount of work, lifting these 1,600 bales, could be done with an electrical motor using one kilowatt each hour of the eight at the total cost to the manufacturer of sixteen cents for a day.

It is probably not an exaggeration to say that by far the greatest majority of complaints which reach the public utility companies come from this misconception of the physical magnitude of work that is done by a kilowatt-hour. An organized effort on their part to interpret this kilowatt in terms of familiar things will go a long way toward popularizing the still greater use of electric energy.

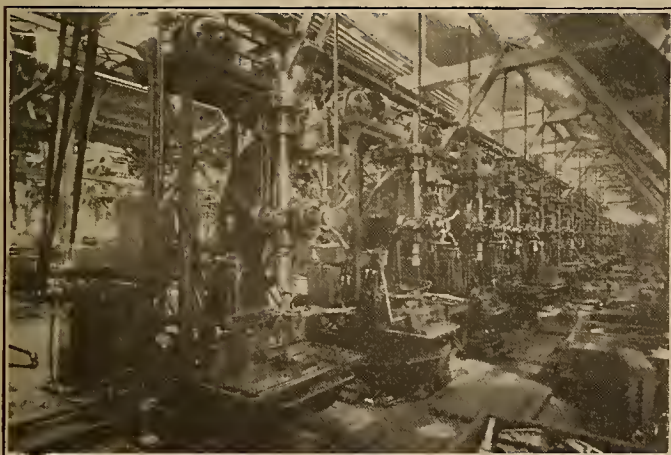
Electrically Lifting the Black Gold

SINCE 1859, when the first oil well was drilled in Pennsylvania, the main object has been to expedite oil production without much regard to efficiency. Now, however, while the object may be the same, the cost of doing so is being given considerable consideration by oil men. Near Fullerton, Calif., there is a special case which is worthy of note and is a case in point where in actual practice it has been proven that electric service is superior and cheaper. This well was first pumped by steam and was very expensive and inefficient. It was changed to electric drive with Westinghouse 15-35-hp., two-speed variable speed motor of the wound rotor type. The speed of the 15-hp. rating is 479 r.p.m. and the 35-hp. rating 965 r.p.m.

This motor will not stall on overloads many times its normal rating and is built with rugged frame and heavy bed-plate to insure service and stability. The motor is connected with a 5 to 1 turbo-reduction gear, and uses the flywheel on the shaft and a weight on the beam for a counterweight. The new installation pumps 70 bbl. of 16 gravity oil a day, an increase of 20 bbl. per day, and operates at less cost than the system formerly in use.

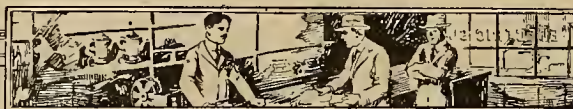
The total weight which the pump has to pull is 32,700 lb., of which the weight of the oil pumped is only a small part. The oil is raised 4,450 ft. at a rate of 70 to 75 ft. per minute. Three lines are operated by the motor and the pumping speed is increased in this way instead of decreased as is the case with the steam engine. This is due to the fact that the last stands are pulled faster than the first by the electric motor, while the steam engine speed is reduced as the last stands are reached because of the falling-off of steam pressure under heavy pulls.

Any pump man is able to look after a field of twice as many motors on pumping wells as is possible where gas or steam engines are used. The increased efficiency of the electric motor will undoubtedly lead to further installations in the oil fields of California and other states where electric power is readily available.



This photograph, taken in the plant of the Holt Manufacturing Company, Stockton, Calif., shows the great advantage which can be obtained in the arrangement of equipment in the modern machine shop by the use of individual drive. The motors occupy no floor space and the control equipment is directly under the operator's hand, permitting the fullest utilization of floor space and the quickest control possible of the motive equipment. Under the very latest practice, a still further step is taken and the compensator is made automatic so that only a push button at the machine tool is required to stop and start the motive equipment.

JOBBER, DEALER AND SALES AGENT



Are You Conducting Your Business Efficiently?

Questionnaire Gives Contractor-Dealer Opportunity to Estimate True Value of Business Methods Followed

Now that the books of the electrical contractor-dealer have been closed for the year 1922 and the attention of the men in the entire industry is turned to 1923, plans for increasing business are foremost in the minds of everyone. Business alone is not what the contractor-dealer is after, but rather business which he can get at a profit and which will lead to more sales to the same customers.

For the wide-awake and enterprising contractor-dealer who is endeavoring to make business better for himself and for the industry in general, the working day starts when he awakens in the morning and often lasts until hours after he has gone to bed at night. The hours spent in the place of business conducted by the merchandiser may be only eight or ten but the brain work which he must perform can not be limited to any definite length of time.

Principles under which the business is to be conducted can not always be definitely formulated during the hours that the head of the firm spends in his

office. Plans for new sales campaigns to be entered upon are most often prepared after the contractor-dealer has come home at night, after the day's work at his store.

To the members of the Electric Service League of British Columbia, who are prepared to spend a little extra time in the evening, looking after the interests of their business, Rey E. Chatfield, secretary-manager of the league, addressed a questionnaire, which is designed to aid the contractor-dealer in bringing his store up to its proper efficiency. The questionnaire was sent out in the form of a bulletin and was prepared to be used by contractor-dealers of the league for their own satisfaction only.

In announcing the purpose of the questionnaire, it is claimed that the winter months are the slackest of the year and are therefore good months in which to look back over the past year and to arrange to correct the mistakes which occurred during the last twelve months. The bulletin is really a

grading chart with which the contractor-dealer can, if he will, honestly grade himself in relation to what is considered as one hundred per cent efficiency.

To the electrical merchandiser, who is honest with himself and who is willing to try to give his store an absolutely fair rating, the grading chart should be of considerable value.

Countless business barometers are published for the business man of today, but no man outside of the firm, who is not conversant with the actual operation of it, can be expected to give any definite statement as to the efficiency of management that prevails in that concern. The man who is willing to admit his mistakes and to profit by them will gain in the end. Mistakes are made in the management of every business and will continue to be made. One of the biggest problems confronting the manager of any concern is to discover these mistakes and then try to eliminate them.

The grading system prepared by the Electrical Service League of British Columbia is designed to aid just such managers who are anxious to remove the mistakes of yesterday. Inefficient management will not be corrected unless the men responsible are ready to search the records of last year looking for blunders that occurred then.

The electrical contractor-dealer may spend eighteen to twenty hours a day worrying over his problems and if he does not seek to correct his past errors, he will be in the same position as the man who kept pouring wine into the barrel at the bung-hole, but failed to turn off the tap.

The grading scheme which Mr. Chatfield prepared gives 100 per cent for a perfect grade. The perfect grade figures appear at the left hand side of the list and at the right is left a space for the contractor-dealer to enter his estimate of his grade.

An Association I Know

By JOE OSIER

Despite the fact that I know that I am laying myself as wide open as a barn door and —

That I may be accused of heresy or convicted for alleged perjury, I intend, in this column, to dilate at length—

As long as the dilating is good, on the subject of "An Association I Know."

It is not my intention, wittingly, to park on any association's or association member's bunions, but, if I do—I shall write another column apologizing—i.e.,—

Providing I can peddle it.

"But, anyway," as the garrulous ol' girl remarked to another g.o.g. over the back fence—

Perfect Grade

Your Grade

| | | |
|------------|---|--------------|
| 6 | Have you an up-to-date accounting system in your business? | ..... |
| 5 | Is your business growing? | ..... |
| 6 | Do you take an annual inventory or maintain a perpetual inventory? | ..... |
| 5 | Do you figure selling price so as in all cases to guarantee you a profit? | ..... |
| 5 | Can you state definitely in percentage what your overhead expense amounts to? | ..... |
| 5 | Have your sales reached a maximum for the expense involved in selling? | ..... |
| 3 | Do you know what lines pay best and which pay least? | ..... |
| 3 | Is your advertising planned carefully ahead? | ..... |
| 3 | Do you push nationally advertised goods? | ..... |
| 5 | Do you discount your bills? | ..... |
| 3 | Do you make a special effort to sell the more profitable articles? | ..... |
| 6 | *Do you turn your stock at least 4 times a year? (Allow 1 for 1 turn; 2 for 2 turns; 4 for 3 turns; 6 for 4 turns; 8 for 5 turns and 10 for 6 turns.) | ..... |
| 2 | Do you meet your customers personally? | ..... |
| 5 | Do you buy from more sources than necessary? | ..... |
| 4 | †Are your windows regularly trimmed and attractively trimmed? | ..... |
| 5 | Do you give prompt and courteous service? | ..... |
| 4 | Do you and your clerks study the merchandise you sell? | ..... |
| 2 | Do you know how it is made and its best talking points? | ..... |
| 3 | Do you make use of manufacturers' free advertising cuts and other helps? | ..... |
| 3 | Do you belong to the Contractor-Dealers' Association? | ..... |
| 6 | Do you attend the meetings? | ..... |
| 3 | Do you read at least 3 good trade journals? (Allow 1 for each) | ..... |
| 2 | Have you a good mailing list? | ..... |
| 3 | Do you use it? | ..... |
| 3 | Do you have cooperation and teamwork in your business? | ..... |
| Total 100% | | Your Grade % |

Question marked † does not apply to contractors, but additional credit for increased turnover in question marked * makes up the difference.

I know an association whose membership is loyal; loyal to the association and one to another;

Where there is no knocking and where the "beefing," differences of opinion and rag chewing is turned to some good account;

Where the members boost each others' business and their mutual interests, generally; and—

Where perfect harmony exists after the hair, teeth and ears have been swept into the corner and the battle definitely ended.

I know an association where every member (not paralyzed or in jail) attends every meeting and—

Where every member sometime during the proceedings lifts his voice—hurls his broadside—says his say, and tells those in attendance specifically, and the world, generally, that he is not—

Painted on a chair.

In this association there are no "yes-sirs" and—

Let George Do Its.

They are all Georges and they pack convincing wallops in either hand or head and—

They seldom, if ever, speak out of turn.

In this particular association, the members pay their dues—in regular money, without grumbling or plaint and—

Special assessments, for worthy purposes, are the things they are fond of.

Time after time, I have known of this association, as a whole, galloping immediately to the rescue of a needy brother member who had run afoul of John Trouble. I have seen them dig down deep and come up with their hands full of ducats which they gladly proffered to the Buddy who was—

Gettin' his'n.

This association did all this and adjourned, forgetting all about the resolution of sympathy which we all know will not buy—

Pork at present prices.

But, best of all, this association's membership "gets together" on the essentials and the big ideas. When the proposition is right, it carries, and this factor, above all others, I think, explains why the association amounts to something.

Now the above expressed truths may fit your particular association. I hope they do. However, if they do not—

Why don't they?

introduction than does the general electrical idea, because of the even later entering of this class of equipment into the markets of the world.

In the campaign conducted by the San Diego dealer, everyone who attended the store was treated as a visitor. The purpose of the week was to educate the people of the California city in the principles of radio and to inform them as to the benefits that they could receive from it. Every afternoon and evening demonstrations were given, showing different classes of equipment in operation. Salesmen were present to explain the operation of the different types of receiving sets.

No attempt to force sales was made during the week. The entire purpose of the firm was to make the people better acquainted with the usefulness of the equipment which they saw in operation at the store. In spite of this a marked increase in radio business was noticed immediately after the week.

The announcement of the Radio Week was made the Sunday prior to the time of starting the demonstrations. Half-pages of display advertising copy were run in the three daily papers, and these announced the time, location and purposes of the special week. Smaller copy followed these preliminary announcements and three-sheet poster boards in various parts of the city were used to reach other people who might have missed the newspaper advertisements. Employees of the company were supplied with banners announcing the week, and these banners were prominently displayed on their automobiles.

The idea was a success, according to the company and Eugene P. Merritt, manager of the concern's radio department, thinks that the Radio Week was in a great measure responsible for the large radio business done by the firm during the Christmas buying period. The advertising costs were the principal ones incurred during the week and these were easily made up for by the larger business resulting from the demonstrations.

Electrical Company Conducts Educational Week

Southern California Company Demonstrates that Company Acting Alone Can Present Special Week with Success

Thinking men of the electrical industry, have acknowledged the fact that the industry is still in its infancy and that it is necessary to educate the public in the use of electrical devices. To make a man change his ways, requires time and patience. This is true regardless of the fact that an effort is being made to make life easier and more convenient for him.

Magazine, newspaper, and direct-by-mail advertising must be resorted to and in addition actual demonstrations of the "way it works" must be presented to the man whose ideas are to be changed. One of the most successful means of providing this information to the public has been the "Electrical Week."

Various incidents of special sales campaigns, in which weeks have been set aside to feature certain articles, have been noticed where cooperative action on the part of electrical dealers has made these "Electrical Weeks" possible and profitable. In most cases, a great deal of time has been spent in mapping out the campaign and it has been necessary for quite a considerable number of dealers to work together to make the week a success.

Cases where special weeks have been arranged for and conducted by only one firm are fairly obscure. The general conception of the special week campaign has mitigated against the use of this selling campaign by the electrical dealer unless aided by other men in the industry.

The advantageous publicity and the educational features of the special weeks are the principal things to recommend them. Cooperative advertising prior to the actual opening of the special displays, has in the past, done a great deal to spread the electrical idea and the success of the idea, when sup-

ported by a number of electrical dealers, has been proven.

The actual demonstrations to persons interested have always been conducted in the stores of the individual dealers. During the week these men have all featured what was being advertised and in this way tied in with each other in the educational campaign.

Considering these points, the Southern Electrical Company of San Diego, Calif., decided to conduct a special Radio Week alone. The company realized that radio equipment needs more

Southern Electrical Co.

RADIO WEEK

A Week for Radio Fans

An Entire Week Devoted to the Instruction and Education
If Everyone Is Now or expects to be Interested in Radio

Radio Demonstrations
Every Afternoon Daily Every Evening

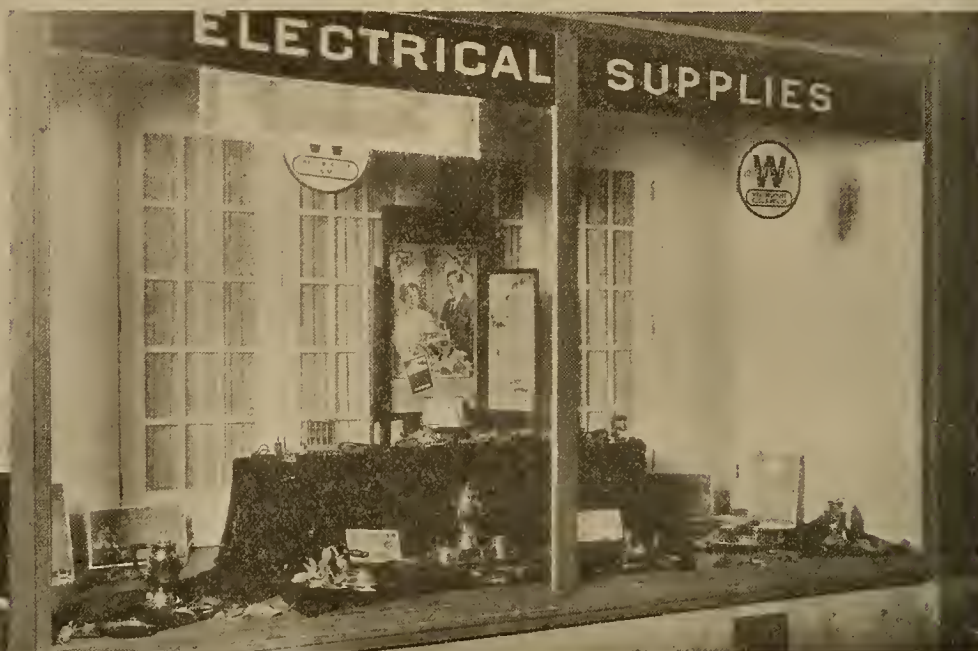
For Your Instruction
We are exhibiting this week the newest
in Radio Sets and Radio Equipment.

Demonstrations Given
Afternoons and Evenings
at our 3rd and E St. Store
Everyone Welcome

Three San Diego Sunday papers carried this half-page advertisement announcing Radio Week.

Every Dealer Can Trim His Own Windows

No window artist was employed to make the setting for the "Cozy Glow Boy" for the Chico Electric Supply Company, shown below.



Carefully planned windows in a jobbers place of business are an inspiration to retailers. The Electric Railway and Manufacturers Supply Company of San Francisco window is shown above.

Small motors were used as a basis for the window in the store of Thomas Day Company in Oakland, shown on the right.



With Service Prepared by Manufacturer

A small corner window presents no difficulties to W.S. Cass of the Chico Electric Supply Company as the window below shows



The material furnished by the manufacturer was used as the basis for the simple display in the window of the Electric Railway & Manufacturer's Supply Company of San Francisco shown at the right.



Two rooms of an electric home were set up in the window of the Buxford Company, Inc., at Fresno, by Stuart Roger, who decorated the window pictured above.



Sell the Woman Buyer the Goods—Not the Price

A Woman's Reaction to the Sales Talk Employed in the Store of the Modern Dealer in Electrical Appliances

By "PRUDENCE PENNY"

When Mr. Editor asked me to write a story for the Journal of Electricity and Western Industry I said, "Oh, dear, I don't know anything to interest the dealers. My work lies with the women, the home makers, and all I know about your people is that I wish some of them would take lessons in real salesmanship."

"That's just what we want," he answered. "Supposing you tell us something about the woman's point of view."

Now, I contend that salesmanship is a great and uncharted sea from the average woman's viewpoint. She does not understand it; in fact, she does not need to do so, but she is keenly interested in the fact that she is purchasing, and that she is the one to make the money go farthest.

I happened in an electrical store not long ago where a clerk had just commenced to show a woman some irons. He showed her the most expensive ones first. After she had compared them in her own mind she ventured with, "What is the real difference in these irons?"

"A dollar and a half, ma'am," urbanely answered the clerk.

"Oh, yes, of course, I know that. What makes the difference? Which points are better, or what causes the difference, maybe I should have said."

Do you know what that man answered? "Well, one is better than the other."

It interested me to see that he lost his sale completely, yet I am convinced that if he had explained to her that the heating element of the more expensive iron was better, that the construction was more perfect, that the materials were just a bit better, he would have sold the best iron in stock.

Women do not buy as they used to. They are seeking value for their money.

They ask more, "How will this stand up under the work, how will it DO MY WORK?" rather than the price, and it is a step in advance of our older ideas.

Now I grant you, I could not sell merchandise behind a counter, but I wager I know more about the average electrical appliance sold in the retail stores of today than do the majority of the clerks, because I take the trouble to find out. When a woman writes to me to ask about a certain electrical appliance I must not only know the price, but the construction, the methods of use. Consequently I am better fitted to sell than the very men who handle the goods.

This is not a criticism upon any man or firm, it is rather upon the methods and the lack of cooperative educational work among the salesmen. There are some shops which are looking to this important work, but many more are not, and the average woman does not understand electricity.

She is afraid of most of the appliances. She feels it is more trouble to use the new inventions than it is to keep on with the old-time devices, hence not only must her interest be aroused, but that subjective little fear removed from her consciousness, and of this I am absolutely certain.

Women must be taught to use and understand the various appliances, not alone from the labor-saving standpoint, but from the standpoint of conserving their energy. They must be shown the ease with which such appliances can be attached and detached, and if a woman has an old-fashioned home, too much stress cannot be made upon the convenience outlet and the fact that old homes can be modernized.

I have listened to men telling women about a washing machine, how it is beautifully enameled, how it is encased

in a wonderful cabinet, how the gears are such and so, how the cylinder or oscillating tub or vacuum plunger is that and this, and never once do they tell her the time it will save. The facts that the clothes will wear longer washed in a good washing machine, that her time is of value and that she can count it in terms of gain when she conserves it, do not seem to be a part of the sales talk of the average salesman.

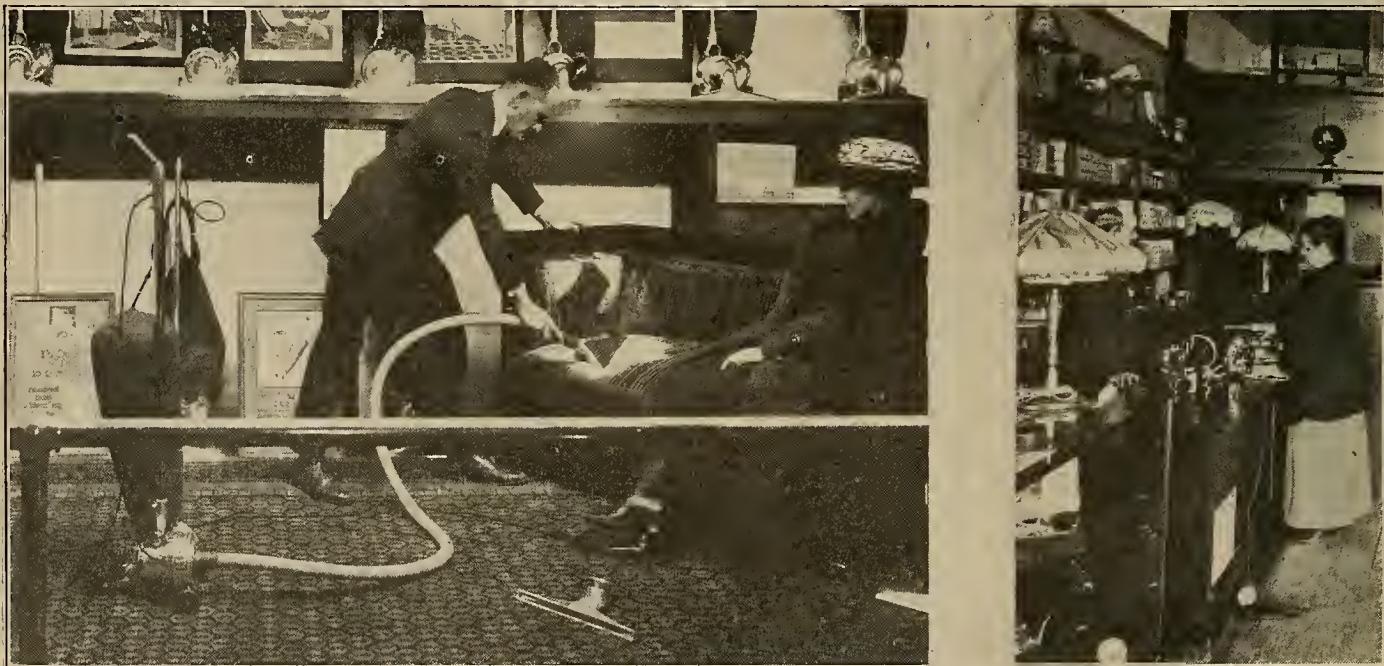
It is the same way with lighting fixtures.

The majority of women purchase those which appeal from an artistic sense. The salesman should have an interest in the psychology of light, how it affects not only the dispositions of the inmates of the home, but also how poor light is a detriment in more ways than one. If a woman learns that she can have a pretty light, yet one that is serviceable and will give the best possible effect for the health and comfort of all concerned, she will naturally purchase it even though it be a bit more expensive.

That is why I feel that dealers should have regularly trained salespeople. The man who sells an electric heating pad should know the value of applied heat to relieve localized pain, and not merely sell something to a woman because it will be a warmer. Hot water bottles can do the same thing, you know.

And once again, I am not a salesperson. I am a purchaser, I do know the great value of electrical appliances, and I am more than hoping that the time will come when every woman of us will use electricity for as much of our home-making as is possible, for I firmly believe in it.

Through cooperation with real estate agents, the architect, builder and the lumber company, the Western Light & Power Company and the Hinde Electric Company of Loveland, Colo., are planning to exhibit an electric home in the small Colorado city. No definite date for opening the exhibit has been set as yet.



Show the woman customer the things that the appliance will do to save her time and work, instead of just telling her that one iron is "worth" more than a lower priced one



An example of the way that the electrical dealer may attract the radio-enthusiast into his store and pave the way for future sales of other electrical appliances

Radio as a Sales Aid to the Electrical Merchant

Dealers Who Handle Radio Equipment Have Many Opportunities to Secure Other Business from the Same Customers

By F. W. CHRISTIAN

There is still some little doubt in a few electrical dealers' minds as to the advisability of carrying a radio stock. This is principally because during the spring they saw a comparatively insignificant item—Radio—spring to the front and become a tremendous business. Then, during the summer months, when people were vacationing, and when it was too hot to stay indoors, the demand fell off and there appeared to be a big slump.

With the coming of the cold weather, the popular interest has revived and the radio sales are again on the upward trend, increasing by leaps and bounds—each day better than the day before. Broadcasting has improved wonderfully in the past month. Several Class B stations have gone into operation. These stations must put on good programs, and also must maintain good modulation. The penalty for failure to do these things is the loss of their license.

Naturally these stations are helping the radio game. B. R. Hassler of the Colin B. Kennedy Company, of San Francisco, on a recent visit to Los Angeles, informed the writer that people in Northern California, who had given up in disgust, had brought out and dusted off their sets, to listen to KHJ—the Los Angeles Times. This is the only Class B station in operation on the western coast at the date of this writing, but others will soon be ready, increasing the interest just as KHJ has done and is doing.

Now, electrical dealers, it is advisable for you to carry a radio stock. You are very much behind the times if you haven't radio. While in an electrical store, making some purchases about a

year ago, the writer witnessed an interesting incident. A well-dressed elderly man asked the clerk for a detector tube and was informed that that establishment did not carry radio. This man was purchasing agent for a large office building. The electrical store, by not having radio, probably lost hundreds of dollars in future electrical business.

Radio brings all sorts of people to your store—doctors, lawyers, engineers, political men, ministers; in short, men of all professions are interested in radio. Radio is the greatest little friend maker you ever saw. Every satisfied radio customer becomes the dealer's friend. He will purchase everything in the electrical line that he needs from his radio dealer. More than that, he will bring his friends to your store to hear the radio or to show them a certain piece of apparatus. A good radio friend means a good customer and a good customer means more good customers and many purchases.

The writer recalls a man, one of his radio customers, who just recently bought a Royal vacuum cleaner of him. Another man has purchased two large tailor irons, another a heater, another a desk lamp and so on ad infinitum.

Many electrical items may be sold for use with the radio set. Among these may be numbered desk lamps and table portables, fans for summer and heaters for winter, wiring devices such as double sockets, attachment plugs, etc. The dealer will find it a very good plan to keep a mailing list of his radio customers, so far as possible, and circularize them or have the salesman call on them. Many electrical appliances may be sold in this manner.

An attractively dressed radio window, combining certain appliances such as heaters and lamps, will do much to help along. People will stop to look, get an idea and oftentimes come in to buy. Others, passing by, will remember the place and return at a future date. By using good salesmanship and the power of suggestion, many good sales may be made. For instance, in selling a radio man a heater, just mention the fact that by hanging the ear-phones down in the center of the reflector, an excellent loud speaker may be had.

The radio business for the future is bound to be good. There are so many good uses for a radio set. The farmer may now receive market and weather reports and news of the city long before his paper arrives through the mail. Get his radio business and you will also have his electrical business.

People need no longer crowd the streets until all hours of the night for election returns, but may sit comfortably at home and get them by radio before they are put on the bulletin boards. These news, election and sport reports alone will cause a great demand for radio sets.

Many churches are broadcasting sermons and members of their congregations will wish to buy receiving sets—more prospective washing machine and vacuum cleaner customers—for we all know how gossip spreads in a church congregation! One satisfied customer tells another member about you, she tells another, and so your store is advertised. Isn't it true?

Radio is here to stay and the radio business belongs to the electrical and radio men. Department stores, drug stores, garages, etc., are gradually dropping out. The music stores seem to think that because radio may be used as a means of musical entertainment, the business belongs to them. How can this be true? What will they do when the customers' batteries go bad and need repairs, or when a tube burns out and the customer wants to know why. Will they be able to properly erect antennas and to advise as to hooking up the set? No—this business belongs to the electrical industry, where it was fostered and developed, and there it will remain.

During the Christmas season just past radio equipment was in demand everywhere. To those dealers who were ready to offer radio to gift-hunters, it proved a great aid. But the time to profit from this trade-getter has not passed entirely. Extra parts will be needed by amateur radio enthusiasts, if you present these parts to them in a logical sales-producing manner. The boy or man who has received an outfit for a Christmas present is a wonderful prospect for any electrical dealer. There are many attachments and small devices that will improve the receiving abilities of any set and that can be sold to the radio owner at a good profit.

The electrical dealer who is ready to reap the benefits from this trade will have the jump on his competitor who is not ready to advance with the industry. The good will that may be obtained from the buyers of radio equipment, when you have served them well, will again add to the totals which you will be able to notice on the right side of the profit and loss account at the end of the year.

INDUSTRIAL NEWS



Four Members Named for State Railroad Commission

Just prior to his retirement from the office of governor of California, Governor William D. Stephens appointed four members to the California Railroad Commission. Terms of the men appointed range from two to six years.

Clyde L. Seavey, city manager of Sacramento, was appointed to succeed H. Stanley Benedict, of Los Angeles, whose term expired Jan. 1. Mr. Seavey was formerly a member of the state board of control and a strong supporter of the proposed Water and Power Act and the King Tax Bill. He will hold office for six years.

Harvey W. Brundige, the president of the commission, was appointed to fill the unexpired term of Harvey D. Loveland, who died about six months ago. This appointment gives Mr. Brundige a term of four years.

The vacancy on the commission caused by the resignation of Chester H. Rowell is to be filled by Edgerton Shore, who, before his appointment to the Railroad Commission, was a member of the state board of control. Prior to his service on the state board of control Mr. Shore was a member of the board of education of Los Angeles.

James T. Whittlesey, a constructing and consulting engineer of San Francisco, will hold office for two years. He takes the place vacated by Mr. Brundige. The manipulation of offices gives Mr. Brundige the four-year term and Mr. Whittlesey, the only engineer, receives the two-year term.

The failure of Governor Stephens to reappoint Mr. Benedict and his appointment of Mr. Whittlesey were the only real surprises of the announcement.

Canadian Company to Construct New High Tension Line

The building of a new high tension line from the Lake Buntzen plants to Vancouver and the reconstruction of the Barnet crossing over Burrard Inlet will be undertaken by the British Columbia Railway Company immediately at a cost of \$172,000.

The present lines and crossing have been in use since 1903. The new line will avoid the water crossing by way of the head of Burrard Inlet. From a point on the present high tension right-of-way to Port Moody a new 34,600-volt line with a single circuit six miles long will be constructed. From Port Moody to Barnet the present line will be reconstructed and relocated, new insulators being used. This section will be five miles long. Copper 3/0 wire will be used for the conductors. Two telephone circuits will be provided. This part of the work will cost \$82,000.

The Barnet crossing is 2854 ft. from tower to tower and at present has only 125-ft. clearance above high water. By replacing the north tower with one of steel, a clearance of 160 ft. will be provided.

The four circuits now on the towers are of half-inch steel cable, but these will be replaced with three heavier circuits of aluminum or copper. This work will cost \$90,000. Work on the new high tension line will begin at once, and as soon as it is completed the crossing will be reconstructed.

Permit Given for Diamond Creek Power Development Dam

A permit for the construction of a \$40,000,000 power dam has been granted to James B. Girand, an engineer of Phoenix, Ariz., by W. S. Norveil, state water commissioner of Arizona. The dam is to be constructed on the Colorado River at the mouth of Diamond Creek, twenty-six miles above Peach Springs, Ariz., and approximately one hundred miles above the site of the proposed Boulder Canyon dam. The Diamond Creek project is to generate 200,000 hp.

An application for a permit for construction and operation from the Federal Power Commission is now pending. Two years ago a permit for the site was granted to Mr. Girand and an agreement was made with the commission, the terms of which provided that when certain development work was completed the commission would grant a license for operation. The development work has now been finished.

The permit in no way conflicts with the provisions of the Colorado River compact recently signed at Santa Fe, N. M., according to State Water Commissioner Norveil.

An assignment of the permit granted by the State of Arizona has already been made to the Colorado River Engineering & Development Company by Mr. Girand. This Arizona corporation will endeavor to start construction on the project the latter part of the month.

Work on the 110,000-volt transmission line of the Puget Sound Power & Light Company, extending from the company's White River hydroelectric plant in King County to the city of Wenatchee is progressing rapidly. The entire 120 miles of right-of-way, crossing two mountain ranges, is cleared and fully one-fourth of the wooden poles and steel towers are up, the steel being used at the higher elevations. This line is expected to pick up a large pumping load from the irrigated section around Wenatchee, Wash.

Puget Sound Co. Purchases Nine Washington Utility Plants

The largest transaction in municipal utilities recorded in the history of the State of Washington was consummated recently when the Puget Sound Power & Light Company, Seattle, a subsidiary of the Stone & Webster Corporation, purchased from the Washington Coast Utilities the light, power, gas, waterworks and ice plants in nine separate towns and communities in the Puget Sound district and in Eastern Washington.

The purchase included: Wenatchee light, power and gas plants; Vashon Island electric light, power and telephone systems; Arlington light and power systems; Edmonds light and power systems; Stanwood light and power system; Elma light and power systems; Montesano light and power systems; Port Townsend light, power, gas and ice plants; South Bend water works.

Acquisition of these various public utilities in a lump was made more readily possible by the fact that they were all previously gathered together by the Washington Coast Utilities, a corporation headed by F. D. Nims. The Washington Coast Utilities maintained head offices in the New York Block, Seattle, and the affairs of the combined companies will, for the time being, be carried on from the New York Block headquarters. Eventually they will be consolidated in the offices of the Puget Sound Power & Light Company in the Electric Building.

The new manager of the utilities purchased will be R. U. Muffley, former superintendent at Bellingham of the Puget Sound Power & Light Company.

The affairs of the companies purchased will be directed by the same official board which administers the affairs of the Puget Sound Power & Light Company, namely: A. W. Leonard, president; W. H. McGrath, vice-president; F. H. Brownell, treasurer, and James B. Howe, secretary.

Fire Damages Southern California Edison Co. Substation

Fire, which threatened to destroy the entire structure of the Eagle Rock substation of the Southern California Edison Company near Los Angeles, burned for eight hours on the night of Jan. 8, causing damage variously estimated between \$100,000 and \$250,000. The fire was caused by an explosion of a 60,000-volt lightning arrester. In addition to the large number of switches and transformers destroyed or damaged by the flames, 160,000 gal. of transformer oil stored in the substation was burned.

Record Submarine Power Cable Laid in San Francisco Bay

The Great Western Power Company, of San Francisco, on Jan. 8, completed the laying of the longest and largest submarine power cable ever installed. The cable is over seven miles long and reaches across San Francisco Bay from the south end of Brooks Island to pier 41 in San Francisco. The cost to the company was approximately \$500,000.

The method of laying the cable is entirely new for power cable laying work. The actual time consumed in laying the 38,500 ft. of cable was two hours and thirty-seven minutes. Before the cable was laid the men in charge thought that it would require at least seven or eight hours to do the work and the record set was a surprise to them. Three tugs pulled the barge which carried the cable and progressed at a rate of over three miles an hour.

The cable is an 11,000-volt three conductor, 500,000-cir. mil. cable capable of transmitting 10,000 kw. It was laid to enable the power company to bring additional hydroelectric power into San Francisco and in this way make possible a reduction in the steam generation of the company.

Because of the unusual length of the cable it was shipped from the factory of the American Steel & Wire Company coiled on gondola freight cars instead of on reels. Four thousand eight hundred-ft. lengths were placed on each car and nine of the largest gondola cars available were used in bringing the cable west.

In laying the cable the entire length of 38,500 ft. was coiled in circular pancake-like coils on a special cable-laying barge. All splices were made before the cable was coiled on the barge and the laying of the cable was one continuous process.

In feeding the cable off of the barge no manual labor was required. Because of the way in which the cable was coiled, it fed off of the barge by its own weight and the tugs pulling the barge advanced the barge as the cable sank into the bay.

The method employed in laying the cable was the same as has been used in laying long trans-oceanic cables, but this is the first time that a long submarine power cable has been installed in this way. The splicing and laying

of the cable was performed under the supervision of A. O. Hoeftmann and J. J. Morrison, factory representatives of the American Steel & Wire Company.

Fifty-five Street Cars Ordered by Oakland Traction Company

Fifty-five double-truck electric street cars have recently been ordered from the American Car Company by the San Francisco-Oakland Terminal Railways Company, of Oakland, Calif. The cars will cost, delivered, approximately \$808,500. Delivery is to be made within five months.

The cars are to be made for one or two-man operation and will be so designed that they can be operated in two-car trains with three men. The cars will be 44 ft. 10 in. long over all and will be of steel construction.

General Electric Company and Westinghouse Electric & Manufacturing Company motors will be used to give the cars four 40-hp. motors. General Electric Company multiple unit control and air compressors are to be installed by the car builders. Brill trucks will support the 35,000-lb. cars.

To facilitate operation in two-car trains, automatic couplers for both air and electrical connections have been ordered. Doors and folding steps on both sides of platforms will be pneumatically operated and will be connected with the usual safety devices on the one-man cars.

Pacific Gas & Electric Company and Western States Gas & Electric Company have been authorized by the California Railroad Commission to transfer to each other certain electric distribution properties near Stockton and Lodi, Calif., that they may eliminate duplication of systems. The properties to be transferred to the Western States were valued at \$104,221, while the properties to be acquired by the Pacific Company aggregate \$42,695. The companies are directed to submit to the commission a method of settlement with consumers for deposits made for extensions or guarantee of bills.

Construction work has started on a 17-mile electric logging road extending up the Santiam River to White City at Upper Soda Springs, Calif. A. A. White of Portland is promoting the enterprise.

Design Transformer to Prevent Fire and Explosion

A transformer using entirely new principles of construction has recently been designed by Walter M. Dann, an engineer of the Westinghouse Electric & Manufacturing Company. The new transformer is said to be so constructed that the danger of its exploding or catching fire is entirely removed.

The chief principle of the new design is the layer of nitrogen gas which is kept over the oil in the transformer. Nitrogen is an inert gas and will not support combustion, so that danger of fire in this way is removed. Should a short circuit occur in the transformer, causing a violent pressure below the oil level within it, the nitrogen is readily compressible and will act as a buffer. Thus no extreme pressure will be exerted upon the walls of the transformer.

The amount of gas in the transformer is kept constant by an automatic device which is attached to the transformer. The nitrogen will also keep the oil from deteriorating and will prevent the entrance of moisture.

New Valuation Placed on Idaho Company by Commission

As a result of a hearing recently completed before the Public Utilities Commission of the State of Idaho, a valuation of \$11,638,459.60 for the properties of the Idaho Power Company has been set as a fair amount for the date of Dec. 31, 1919. From this sum the commission has ordered that 13.25 per cent be deducted to allow for property owned but not fully useful and not entitled to a full return.

To the balance obtained after making the deduction ordered, must be added the value of additions and improvements during the years 1920 to 1922, inclusive.

In announcing the base of 1919, the commission has ordered that a hearing be conducted to bring the valuation down to date and to fix rates which shall be charged by the power company. The hearing has been scheduled for Jan. 22. At the time stipulated, rules, regulations and forms of accounts for the accumulation, protection and expenditure of depreciation funds will also be made for the company.

The Shevlin-Hixon Lumber Company of Bend, Ore., has contracted with the General Electric Company to furnish a 1,500-kva. synchronous condenser. The lumber company has several thousand horsepower of induction motor load and more generating capacity was needed. It was found that by using a synchronous condenser to supply magnetizing current, the generators were available for supplying energy current. This scheme worked out cheaper than buying generating equipment of the same capacity. As far as is known, this is the first synchronous condenser to be used in a sawmill in the northwest.

The index to Volume 49 of the Journal of Electricity and Western Industry has been printed and is ready for distribution to subscribers. The index may be secured by addressing the Circulation Department of the Journal of Electricity and Western Industry, 531 Rialto Building, San Francisco, Calif.



Barge laying Great Western Power Company cable across San Francisco Bay

Pacific Gas & Electric Company Given New Rate Base

Holding to its decision that the historical reproduction cost basis is a correct one for controlling the establishment of power rates, the California Railroad Commission has recently set the rate basis of the Pacific Gas & Electric Company at \$109,723,695. This new valuation will reduce the rates of the company about 12 per cent and will bring about an annual saving to customers of the company of about \$2,500,000. The rates are designed to give the company a return of 8 per cent on the commission's findings of reasonable investment.

Industrial power rates in general are reduced 10 per cent and a uniform schedule is made applicable all over the system. Agricultural schedules are modified, and where schedules have overlapped this discrepancy has been eliminated.

A special discount in rates was ordered to be made to resale companies to assist in developing rural territory served by these resale companies. The company has also been directed to purchase transformers from consumers taking reclamation service and to make extensions over private property where public highways are not reasonably available. The wholesale power schedule has been modified to give lower rates to consumers operating at high load factors.

The new lighting rates will go into effect Feb. 1 on flat rates and will obtain after Feb. 20 where meters are used. The new schedule for the San Francisco Bay region is as follows:

First 40 kw-hr. or less per meter per month, \$0.90 per month.
Next 40 kw-hr. per meter per month, \$0.06 per kw-hr.
Next 150 kw-hr. per meter per month, \$0.05 per kw-hr.
Next 800 kw-hr. per meter per month, \$0.04 per kw-hr.
Next 2,000 kw-hr. per meter per month, \$0.03 per kw-hr.
Over 3,000 kw-hr. per meter per month, \$0.02½ per kw-hr.

Local Utilities to Be Taxed by Utah County Assessors

As the result of a recent decision handed down by the Supreme Court of Utah, the right of county assessors in that state to levy and collect assessments on public utility companies having no physical inter-county connections has been upheld. For several years past all public utilities in the state have been assessed by the state board of equalization regardless of inter-county connections.

During the past summer the question was submitted to Attorney General Harvey H. Cluff, who held that assessment of such properties was a purely local affair. On his advice the state board removed its assessment from the Telluride Power Company and the Garfield County assessor made the levy on the property. The case which has just been decided, was instigated against the county assessor of Garfield County by the power company.

Three new transformers of large capacity are being installed by the Idaho Power Company at its American Falls plant. The transformers will take care of any increase in power that may come from the plant and will aid in the handling of the present output of the plant.

Complete Oregon Hydroelectric Power Plant by March

Work on the 10,000-hp. hydroelectric plant of the Pacific Power & Light Company on the Hood River is rapidly nearing completion. About 150 men are now employed on the laying of a pipeline which will be about two and one-half miles long.

The new power plant will be connected with the plant of the Northwestern Electric Company on the White Salmon River, in Klickitat County, Wash., by way of a transmission line suspended over the Columbia River. The plant, according to the Phoenix Utility Company, the builders, will be completed by March and will cost in the neighborhood of \$1,250,000.

There are available several bound volumes of the Journal of Electricity, Power and Gas which cover the period from Jan. 25, 1913, to Dec. 31, 1917. The issues comprise Volume XXX, No. 4, to Volume XXXIX, inclusive. The issue of May 27, 1916, Volume XXXVI, No. 22, is missing. Information concerning these volumes can be secured from the Editorial Department of the Journal of Electricity and Western Industry.

Denver Celebrates Completion of Street Lighting System

A carnival celebrating the installation of an ornamental street lighting system was held on Santa Fe Drive in Denver Dec. 15-16, at which city officials, merchants, and residents of the west side in that city participated. According to reports, it was one of the most successful community celebrations ever staged in Colorado, and its success, it is said, was due in no small part to the assistance given by the electrical industry.

The Santa Fe Drive Commercial Association financed the street lighting

system, while the paving was done by the city for the property owners of the district. It is the first step in improving that section of Denver, according to the speech of acceptance made by Mayor D. C. Bailey, which will lead to the completion of the project and further improvements along the entire driveway to Overland Park, the municipal camping grounds.

The lighting standards were supplied by the Mountain States Machinery Company and the units by the General Electric Company. E. E. Stettler, a prominent west Denver electrician, was a member of the committee which financed the project. A radio concert was broadcasted at his store during the carnival with loud-speaking apparatus provided by the Western Electric Company. The radio program itself was arranged by the Electrical Cooperative League of Denver.

Idaho Farm Users of Electricity Are to Receive Rebate

Complying with a special act of the last legislature, the Idaho public utilities commission has issued an order granting a rebate to all irrigation farmers in the state using electricity for pumping. The total rebate ordered by the commission amounted to \$47,232.87, divided among four power companies supplying current for irrigation purposes in the state during the 1922 irrigation season.

The law passed by the last legislature exempts all power companies furnishing power for irrigation from the payment of a certain portion of their taxes, but requires them to rebate the entire amount of this exemption to the individual farmer users.

The rebates range from \$2.4064 per hp. used to \$1.2904. This rebate will be paid to the farmers who have used the electric power during the 1922 irrigation season.



Part of the crowd that was present at the dedication of the new ornamental lighting and street-paving project in Denver, Colo. D. C. Bailey, mayor of Denver, addressed the crowd and threw the switch which closed the circuit for the first time

San Francisco Supply Company Prepares for Expansion

An issue of \$250,000 capital stock has just been sold by the Atlantic-Pacific Radio Supplies Company of San Francisco, 85 per cent subscribed by present stockholders, for the purpose of financing its 1923 expansion program, which contemplates adding new radio lines to those the company is now distributing, greatly increasing the present sales force, and adding an electrical department, which will act as a distributor for standard electrical merchandise, working through recognized trade channels in the Pacific Coast and Rocky Mountain states. W. M. Deming, president and general manager of the company, who is largely responsible for this aggressive policy, is authority for the statement, and he says that representation of many additional lines, both radio and electric, have already been offered the company.

Mr. Deming is a national figure in the electrical industry, being the former publisher of the "Journal of Electricity," and now president of the Electric Supply Company of Memphis, Tenn., in addition to his present important capacity with the Atlantic-Pacific Radio Supplies Company. The company boasts of another well-known electrical engineer in the person of T. D. MacMullen, secretary and assistant general manager, who is also secretary of and director in the Majestic Electric Development Company of San Francisco, where he was sales manager until recently. Both Mr. Deming and Mr. MacMullen are enthusiastic over the company's new electrical department, and predict that in that industry it will soon attain a prominence which the company has already acquired in the radio field.

Those familiar with the radio business will remember that it was the Atlantic-Pacific Radio Supplies Company which named and marketed A-P vacuum tubes, and which more recently has received considerable publicity as distributor for a new type of receiving set. This device, it is claimed, will give most remarkable results even over long distances without using either an aerial or a ground connection.

Other radio lines now distributed by the company include Cutler-Hammer rheostats, Alden-Napier sockets and dials, Carter radio plugs and jacks, Dayton variometers and variocouplers, Westwyre variable condensers, Pacent electric plugs and jacks, and Philadelphia storage batteries, and A-P radio sets, parts and supplies, which the company manufactures in its own plant.

Denver Christmas Sales Exceed All Previous Records

A volume of appliance sales greater than during any one month last year is reported for the two weeks which immediately preceded Christmas in Denver by the Electrical Cooperative League of that city. Electric shops, department and hardware stores, and the central station all experienced a rush developing from the electrical Christmas advertising campaign, and the results are confirmed by the depleted stocks of jobbers in that city.

A number of downtown electrical dealers along with the central station are said to have experienced record-breaking sales the day or two before

Christmas. One dealer reported a hundred per cent increase over the previous year, while several said that their sales were 50 per cent greater than last year, when sales in electrical merchandise were greater than in other staple lines.

All seasonal stocks on the shelves of jobbers were exhausted almost a week before Christmas. Standard lines of appliances were depleted and as a consequence considerable obsolete merchandise was moved.

According to the jobbers in Denver, one of the primary factors responsible for the marked activity was the advertising campaign of the league. Seven full-page spreads of advertising appeared in the newspapers of that city in the two weeks prior to Christmas and considerable individual advertising was done between times along with the cooperative advertisements appearing over the name of the league.

In addition to the newspaper advertising another feature instituted by the league for the first time is said to have been the trimming and decorating of dealer-members' store windows along practical standard lines. The league staff, in conjunction with several manufacturers' specialists, worked on ten windows and changed a number of them at least twice during the two weeks. Attractive posters, streamers, and other features were provided by the league, although the cost of the individual window trims was stood by the dealer.

No outside interests were solicited in staging the campaign, it is said, all advertising and newspaper features having been prepared by S. W. Bishop, executive manager of the league, and his assistant, F. J. McEniry.

A petition for a certificate of public convenience and necessity to supply the Willits Valley and the town of Willits, Calif., has been applied for by the Central Mendocino County Power Company. In a second petition before the California Railroad Commission, the company has requested authority to acquire the electric plant of the Northwestern Redwood Company and the water plant of the Willits Water & Power Company. The price agreed on for both properties is \$66,500.

Nevada Power Company Gets Lease on Generating Plant

Approval of the lease between the government and the Nevada Valleys Power Company of Carson City, Nev., for the Lahontan power plant was given to attorneys of the company by Director of the United States Reclamation Service Davis, and Secretary of the Interior Fall, just prior to the latter's resignation. The lease is to extend from 1924 to 1934 and in return for the lease the company is to abandon all claims for power rights on the Truckee River, near Vista, Nev.

The contract provides for certain improvements to the Lahontan plant which will increase the power efficiency and will broaden the service of the plant.

The Nevada Valleys Power Company supplies service to the Newlands Project, Fallon, Hazen, Lovelock and other Nevada towns. It is a subsidiary of the Canyon Power Company of California.

The Pacific Power & Light Company will spend \$500,000 on development in Umatilla County during 1923. Plans call for the completion of the high line from Pasco to Pendleton via Umatilla, the construction of another lift on the Pendleton gas tank and for replacement work on the lines on Court street in Pendleton.

Install Electric Appliances for Domestic Science Classes

The South Washington Junior High School at Ogden, Utah, has installed complete electrical equipment in its Domestic Science Department. This equipment consists of 32 1000-watt Hotpoint Hughes hot plates and one No. 50 Hughes range.

The hot plates are mounted on specially built fixtures manufactured by the Capital Electric Company of Salt Lake City, Utah. The instructors and pupils at the school are delighted with the operation of this new electrical equipment, and a keen interest is being taken in the domestic science branch of the school's activities.

Since this equipment was installed there has been a duplicate installation made at a new high school at Green River, Wyo.



Freshman girls ready for work in one of the domestic science classes of the South Washington Junior High School at Ogden, Utah.

Public Officials Are Guests of Electric Club Members

When the Electric Club of Los Angeles held a Bureau of Power and Light Day, Andy Gump, "the man 100 per cent for the people all the time," was one of the guests at the speakers' table. The aspirant for Congressional honors has evidently come to recognize the political power of the electrical in-

A special schedule is provided for electro-chemical service and railway power rates are made the same as those fixed for the Pacific company. The present flat rate for water heating being held unduly low, is closed to new consumers.

In general, the same principles of valuation and rate-making were applied to the Great Western as to the



Sitting at the speakers' table at the Bureau of Power and Light Day held by the Electric Club of Los Angeles, were (reading from left to right): T. J. Pace, manager supply division, Westinghouse Electric & Manufacturing Company, East Pittsburgh; E. F. Scattergood, R. F. DelValle, H. W. Allen, Andy Gump, Carl Heintz and P. H. Booth, district manager Edison Electric Appliance Company.

dustry and has now tied himself with it.

The Bureau of Power and Light Day is an annual one with the Los Angeles Club. H. W. Allen, sales manager of the Graham-Reynolds Electric Company, presided at the meeting and later turned it over to R. F. DelValle, president of the Board of Public Service Commissioners, who acted as chairman of the day.

Carl A. Heintz, assistant electrical engineer in charge of distribution of the power and light bureau, and Ezra F. Scattergood, chief electrical engineer of the bureau, were the speakers. Both men presented interesting talks concerning the activities of the Bureau of Power and Light in Los Angeles.

Rate Schedule of Great Western Power Company Revised

Rates reflecting a reduction of approximately 10 per cent on the system as a whole were established for the Great Western Power Company of San Francisco in a decision recently announced by the California Railroad Commission. The rates are practically identical with the new rates of the Pacific Gas & Electric Company, and as in the case of the latter are entirely new, taking the place of existing rates and surcharge. The rate structure eliminates various discriminatory rates, and for that reason the percentage reduction is not uniformly applicable to all present charges. Flat rates are effective Feb. 1 and meter rates effective Feb. 20.

The rate of return that the company will earn under the new rates will not exceed 7.2 per cent, according to the estimate of the commission.

Pacific Gas & Electric Company. The historical reproduction cost method of arriving at physical valuation for rate-making purposes was used in both cases.

The rate base found reasonable is \$40,144,479. Including items eliminated, the company claimed a rate base of \$69,516,725. From the estimated cost of structural property there was deducted \$1,783,000 on account of excessive expenditures in the construction of the Caribou plant and \$1,323,000 on account of the exclusion from the electric system of the steam heating part of the company's business.

While the cost of the Caribou plant was reduced in the rate base, the company was commended for having undertaken this development when it did. At the time there was a downward trend of prices which, however, soon shot up to unprecedented heights. This, together with unforeseeable physical difficulties, caused the cost of this undertaking greatly to exceed the original estimate.

The Shorey Light & Power Company has recently filed articles of incorporation for \$50,000, and will operate in Reedsport, Ore. The company will install and operate an electric light and power system for that town and nearby towns.

Application to the state engineer of Oregon has been made for permission to use water from the South Santiam River in Linn County, near Foster, sufficient to develop 1,023 hp. This power would be used by Almond A. White of Albany in connection with a logging road and sawmill.

Lumber Company Buys Large Block of California Timber

Timber in the Plumas National Forest, Calif., totaling 167,000,000 ft., has recently been sold to the Swayne Lumber Company for about \$360,000. The timber covers about 14,000 acres in what is known as the sugar pine-yellow pine belt in the heart of the Sierra Nevada Mountains in California.

It has been estimated that the cutting of this timber, together with the inter-mixed privately owned timber, will require eight years to cut and convert into lumber. Twenty-one miles of railroad will be built to connect with an existing railroad 40 miles in length. The lumber company has been logging on private lands in this watershed.

The Elko Lamoille Power Company, of Elko, Nev., has recently completed the installation of a 365-hp. Busch Sulzer Brothers diesel engine at its plant at Elko. The engine is direct-connected to a 312-kva General Electric Company generator, which is direct-connected with an exciter.

Books and Bulletins

HENDRICKS' COMMERCIAL REGISTER

Published by S. E. Hendricks Company, Inc., 70 Fifth Ave., New York. \$15.

The thirty-first annual edition of this valuable book for buyers and sellers has been considerably revised and enlarged so that there are few firms or products which cannot be found inside its covers. Especially devoted to the interests of the electrical, engineering, hardware, iron, mechanical, mill, mining, quarrying, chemical, railroad, steel, architectural and contracting industries, it forms a complete and reliable register of producers, manufacturers, dealers and consumers connected with these industries. Products are listed from the raw material to the finished article, with the concerns handling them from the producer to the consumer. It should be invaluable as a buyers' reference for anyone connected with these various industries. It should also prove of value in preparing mailing lists. One of the chief features which recommends this book is the indexing. Trades are indexed and classified as are trade names. Manufacturers are also listed alphabetically.

WHO'S WHO IN ENGINEERING

By JOHN WILLIAM LEONARD. 1,509 pages. Cloth. 6 by 10 in. \$10. John W. Leonard Corporation, Brooklyn, N. Y.

This is the first edition of a biennial reference book containing biographical sketches of contemporary American and Canadian engineers. It contains concise but complete life statistics and professional records of 10,494 engineers. Most of the information contained in the book is nowhere else readily available. As a pioneer to fill a long-felt want, and as a highly creditable publication from every standpoint, it is certain to receive the support of the entire engineering profession.

Meetings

Rocky Mountain Electric League Elects New Officers

The second annual meeting of the Rocky Mountain Electrical Cooperative League was held at Salt Lake City, Dec. 4. The principal business transacted was the election of trustees for the ensuing year from the four branches of the industry. The members of each branch chose the following representatives to act as members of the board of trustees:

Central Station—S. R. Inch, P. M. Parry, H. M. Ferguson and R. M. Bleak, all of Utah Power & Light Company.

Manufacturers—Robert Miller, General Electric Company; W. A. Moser, Westinghouse Electric & Manufacturing

The following officers were elected to serve during the ensuing year: chairman, W. A. Moser, Salt Lake City manager, Westinghouse Electric & Manufacturing Company; vice-chairman, A. J. Calloway, sales manager in charge of Salt Lake office of Western Electric Company; secretary and treasurer, R. M. Bleak, superintendent of lighting and appliance sales, Utah Power & Light Company.

Committees to Organize Annual Convention Announced

To arrange for the annual Pacific Coast Convention of the American Institute of Electrical Engineers, committees have recently been appointed by H. H. Henline, chairman of the San Francisco section. The convention will be held at Del Monte, Calif., the latter part of September.

Chairmen and members of the committees have already started to work making arrangements for the convention and it is the plan to have the organization of the program well under way by Jan. 26. It is planned to have a meeting of the committeemen before this time and a definite date for the convention will be considered at this time.

Professor Harris J. Ryan, of Stanford University, has been named general chairman of the convention and Robert Sibley has been appointed vice-chairman. The other committee members are as follows:

Papers Committee—S. J. Lisberger, Chairman; H. W. Hitchcock.

Arrangements Committee—W. C. Heston, Chairman.

Entertainment and Banquet Committee—W. B. Sawyer, Jr., Chairman; W. P. L'Hommedieu, Miss C. Grunsky.

Reception Committee—H. H. Millar, Miss C. Grunsky.

Registration and Transportation Committee—R. A. Balzari, Chairman; Henry Bosch, Jr.



A. J. Calloway, newly-elected vice-chairman of the Rocky Mountain Electrical Cooperative League

Company; B. E. Rowley, Edison Electric Appliance Company, and S. S. Stevens, Stevens Sales Company, representing several manufacturers.

Jobbers—J. A. Kahn, Capital Electric Company; C. B. Hawley, Intermountain Electric Company; J. D. Nicholson, Mine & Smelter Supply Company, and A. J. Calloway, Western Electric Company.

Electragists—Fred C. Wolters, Modern Electric Company; George R. Randall, Salt Lake Electric Supply Company; C. E. Dodge, Dodge Bros. Company, and E. H. Eardley, Eardley Electric Company.

A report of the league's activities during the past year was presented by P. L. Goddard, executive secretary.

Radio demonstrations and talks were also presented by J. G. McCollum, of the Intermountain Electric Company, and E. C. Painter, of the Capital Electric Company.

On Dec. 11, a meeting of the new board of trustees was held, for the purpose of electing officers of the league for the year 1923. At this meeting, also, the reports of various committees as to their activities during the past year were received.

Convention Dates Are Set by Electric Associations

The annual convention of the Pacific Coast Electrical Association will be held at the Fairmont Hotel, in San Francisco, June 19-22 inclusive. No definite plans for the program have been made as yet.

According to early reports, the convention of the National Electric Light Association will be held June 4-8, at the Commodore Hotel in New York City. The later date in June will permit officials of the national association to be present at the San Francisco meeting of the Pacific Coast electrical men.

Electric Club of Los Angeles Makes Orphans Happy

Aided by Jackie Coogan, the youthful screen star, the Electric Club of Los Angeles was host and Santa Claus to fifty-one orphans from the Kiddie Koop Home of the city. The Christmas celebration conducted by the club was held at the Goldberg Assembly rooms, which had been decorated for the occasion with a large electrically lighted Christmas tree.

The Saturday afternoon before Christmas was the day chosen by the club to make the orphans happy with presents, which corresponded to the requests that the children had made upon Santa Claus. A large papier mache orange, furnished by the California Fruit Growers' Association, became the center of attraction when Jackie Coogan emerged from its interior and aided Santa Claus in distributing the presents.

This is the second year that the Los Angeles club has given a Christmas party for the children. All through the past year the club has given financial aid to the home.

Second Annual Electrical Party Held by Denver League

Another successful electrical party is reported as having been staged in Denver by the Electrical Cooperative League of that city. In the interest of greater personal harmony and friendship, the league sponsored the social event and its success is reflected in the attendance of nearly two hundred couples.

Dancing and cards, entirely informal, were the attractions at the party, which was staged at the Albany Hotel the night of Jan. 9. Over a score of prizes, ranging from a vacuum cleaner to a flashlight, were donated by members of the industry as awards in the card games and special dances.

The success of a similar function a year ago warranted a repetition this year, according to the entertainment committee which handled both events. Clarence Keeler of the Denver Gas & Electric Light Company was the chairman of the committee and he was assisted by H. Alex Hibbard, secretary of the Denver Association of Electrical Contractors and Dealers, and H. W. Overbeck of the Mine & Smelter Supply Company.

COMING EVENTS

American Institute of Electrical Engineers—

Midwinter Convention—New York, N. Y.

Feb. 14-16, 1923

National Electric Light Association—

Annual Convention—New York, N. Y.

June 4-8, 1923

Pacific Coast Electrical Association—

Annual Convention—San Francisco, Calif.

June 19-22, 1923

California Contractor-Dealers to Meet in Sacramento

The first regular meeting of the California State Association of Electrical Contractors and Dealers for 1923 will be held at the Traveller's Hotel, Sacramento, on Jan. 27. For the accommodation of those members of the organization in the San Francisco Bay region a special boat has been reserved for the round trip, leaving Friday night, Jan. 26.

The program for the session will include a meeting of the executive committee on the morning of Jan. 27, a members' business meeting in the afternoon and a get-together meeting and dinner in the evening, to which all branches of the electrical industry have been invited.

Personals

Paul R. Jones, chief auditor and secretary of the Cities Service Company of New York, operators of the Denver Gas & Electric Light Company, is a recent Denver visitor.

H. E. Lane, director of the Joint Committee for Business Development, will be the chief speaker at an electrical dinner to be given in Denver under the auspices of the Electrical Cooperative League, Jan. 25, at the time of the national commercial section meeting of the N.E.L.A. in that city.

H. W. Reed, who recently was connected with Landers, Frary & Clark, is now connected with the Illinois Electric Company in Los Angeles.

Clotilde Grunsky, contributing editor of the Journal of Electricity and Western Industry, has been re-elected president of the San Francisco Business and Professional Women's Club.

T. H. Rhodes, formerly salesman for the Dallas branch of the Western Electric Company, has been transferred to the Los Angeles office of that company.

Lewis A. McArthur, general manager of the Pacific Power & Light Company, Portland, has been made vice-president of the company. Mr. McArthur was born in The Dalles, Ore., in 1883. He was educated at the Portland Academy, Portland, from which institution he was graduated in 1902, and subsequently was graduated from the University of California with the degree of B.S. in 1908. During his time in college, Mr. McArthur was editor of the Daily Californian, which at that time was the largest college newspaper in the United States. After graduation Mr. McArthur served as station agent and ticket clerk of the Oregon Electric Railway Company until 1910 and then he joined the



LEWIS A. McARTHUR

Pacific Power & Light Company as chief clerk and successively held the positions of purchasing agent, chief clerk to the president, assistant general manager and general manager. Mr. McArthur is an authority on geographic matters and on Oregon history, and was the recipient of an honorary degree of Master of Science and Public Service from the University of Oregon in 1921.

G. W. Barker, electric range expert of the San Francisco division of the Pacific Gas & Electric Company, has been promoted to the position of domestic appliance sales engineer, operating out of the office of the electric sales department of the company.

D. C. McClure, electrical superintendent of the Denver Gas & Electric Light Company, returned from New York just before the holidays after spending a month in the East in the interest of extensive improvements contemplated by his company.

Hugh H. Williams, a member of the New Mexico Corporation Commission, has been appointed a member of the federal and state legislative committee of the National Association of Railway and Utility Commissioners.

J. C. Hobrecht, Sacramento contractor-dealer, has been named chairman of the executive committee in charge of the annual Salvation Army drive for funds in Sacramento.

A. C. Cornell of the Western Electric Company, H. D. Randall of the General Electric Company, and John J. Cooper of the Mountain Electric Company and chairman of the Denver Electrical Cooperative League, have been appointed a committee to guide the finances of the Rocky Mountain Committee on Public Utility Information in the second year of its activities.

George F. Nicholson, chief engineer, Port of Seattle, and J. W. Bowerman, Seattle appraisal engineer, have been nominated for the presidency of the Seattle Chapter, A.A.E. The election will be held at the first meeting in January.

George W. Bernhard, formerly manager of the northwestern district of the Great Western Power Company and special agent at Sacramento, has been named district manager at Oakland to replace F. H. Woodward, recently made commercial manager of the company.

B. C. Holst, western manager for W. N. Matthews & Bro., Inc., has left for an extended eastern business trip. Before returning to his San Francisco headquarters Mr. Holst will visit his company's factory at St. Louis.

F. M. Stout, manager of the Denver office of the Celite Products Company, has been promoted to one of the eastern offices of the company. J. P. Arnold is now in charge of the Denver office of the company in the Symes Building.

G. L. Parker, district engineer of the water resources branch of the U. S. Geological Survey, was recently the guest and principal speaker at the monthly meeting of the Seattle Section, A.S.C.E. Mr. Parker presented a motion picture and lecture entitled "The Story of Water."

J. C. Jones, manager of the central station division of the Los Angeles Westinghouse office, is leaving Los Angeles for an extended trip through the East, visiting the manufacturing centers of the Westinghouse Company. While there he will visit the executive offices of the company at East Pittsburgh.

C. F. Oehlmann, an executive of the Denver Gas & Electric Light Company, and a prominent member of the Denver Motor Club, has been elected head of the Western Hills Auto Association, designed to promote automobile races of national interest during the Pageant of Progress in Denver next July.

T. L. Nudd, former electrical engineer with the Newbery Electric Corporation of Los Angeles, in charge of estimating and engineering, has been made electrical engineer for the Allied Architects of Los Angeles, supervising inspecting and estimating. Mr. Nudd began his career in the electrical industry in 1910 as a lineman for the Pacific Gas & Electric Company in the Solano district. He



T. L. NUDD

entered the University of California in 1912, and was graduated with the class of 1917 from the department of electrical engineering. Subsequently he became inspector of electrical material at the Mare Island Navy Yard, student electrical engineer at the Boston Institute of Technology and pilot in the U. S. Naval Flying Corps. Following the World War he was electrical inspector in the bureau of Yards and Docks, Navy Department, supervising electrical installations at the San Diego Public Works Office. He joined the Newbery Electric Corporation in 1920 as electrical engineer and held that position until his resignation. Mr. Nudd's connection with the Allied Architects of Los Angeles promises to be reflected in increased interest on the part of this body in the electrical features of homes and buildings erected under their supervision.

H. H. Hickman, sales manager for Haag Brothers Company, Peoria, Ill., has spent several weeks on the Pacific Coast analyzing western business conditions. Mr. Hickman visited Salt Lake City, Seattle, Portland, San Francisco and Los Angeles.

A. L. Dunmire, western representative for the Line Material Company, has returned to his offices at Oakland, Calif., after attending the annual sales convention of the company at Milwaukee.

Carl G. Schluederberg, assistant to the managers of the supply and merchandising departments of the Westinghouse Electric & Manufacturing Company and special representative of that company in foreign countries, left recently for a four months' trip in the Orient to study business conditions there. Mr. Schluederberg will visit Japan, the Philippines and China to make a sales survey, investigating especially the possibilities of expansion of the market for household appliances.

Fred Hazard, director of sales of the Conlon Electric Washer Company, Cicero, Ill., spent the holidays in Colorado.

Secretary Albert B. Fall, of the Department of the Interior, has announced his intention of resigning from President Harding's cabinet on March 4 to return to the practice of law and the conduct of his private affairs in New Mexico.

W. O. Hoeftmann, of the engineering department of the United States Steel & Wire Company, has been spending several weeks in San Francisco, preparatory to supervising the laying of the world's record high tension cable across San Francisco Bay by the Great Western Power Company.

W. A. Hillebrand, sales engineer for the Ohio Brass Company, and former professor of electrical engineering at Stanford University, delivered a highly interesting and instructive lecture before the joint meeting of the Portland sections of the American Institute of

James T. Whittlesey, prominent consulting engineer of San Francisco, has been appointed to a two-year term as commissioner on the California State Railroad Commission. After graduating from Yale he was with the Thompson-Huston Electric Company from 1889 to 1890. He then went to New York as consulting engineer and in 1892 he entered the services of the Brooklyn Street Railroad where he spent four years in the motor department. During the succeeding two years he was chief engineer of the Brooklyn Rapid Transit Company. In 1898 he became superintendent of the Stephenson Car Company of New Jersey. For three years following 1900 he was chief engineer of the United Electric Company of New Jersey and following this held the same position with the Public Service Corp., of New Jersey. In 1912 he removed to California and was retained by the Messrs. Spreckels of San Francisco to advise them in their large public utility interests. During the past five years he has been director of the Pacific Coast branch of the Engineering Business Exchange, with offices in San Francisco. In this capacity he has made engineer-



JAMES T. WHITTLESEY

ing reports and investigations on industrial enterprises for interested clients. He is a member of the A.S.M.E., A.I.E.E. and the American Electro-Chemical Society. Mr. Whittlesey's many years of experience in engineering and public utility fields well qualifies him for his new work and his appointment satisfies a long-felt need for an engineer on the California commission.

A. R. Wooley of the Edison Electric Appliance Company and M. E. Lanning of the Westinghouse Electric & Manufacturing Company, assisted the staff members of the Electrical Cooperative League in Denver in trimming the windows of dealer-members during the electrical Christmas campaign.

Clare N. Stannard, vice-president and general manager of the Denver Gas & Electric Company, has been appointed a member of the industrial advisory board recently appointed by William E. Sweet, governor of Colorado.

Hugh Gordon, attorney, and Richard Sachse, chief engineer of the California State Railroad Commission, are back from Washington, where they represented the commission in the final valuation hearings held before the Interstate Commerce Commission dealing with the Western Pacific Railway Company, Tonopah and Tidewater Railway Company and the Riverside, Rialto and Pacific Railway Company.

H. R. Noack, vice-president of the Pacific States Electric Company, with headquarters in San Francisco, was a recent visitor in Portland.

Louis R. Lee, chief engineer with the E. W. Clark & Company, Management Corporation of Columbus, Ohio, is spending two weeks with the Portland Railway Light & Power Company engineers going over the development plans for 1923.

Clare N. Stannard, vice-president and general manager of the Denver Gas & Electric Light Company, gave a short talk on the growth and development of the Cities Service Company at the weekly meeting of the Rotary Club in Denver, Dec. 14.

D. D. Sturgeon, an electrical contractor who is a member of the Denver Rotary Club, represented that organization at a meeting in Pueblo, Colo., Dec. 1, when representatives of all similar organizations in that state met to form a Greater Colorado Club.

Joseph P. Arnold has tendered his resignation as secretary of the Denver chapter of the American Association of Engineers to become the Rocky Mountain representative of the Celite Products Company.

David G. Ong, vice-president and general manager of the Gillespie-Eden corporation with headquarters in New York City, is a western visitor, having stopped in Denver and Salt Lake City before continuing his journey to the coast where he is visiting the representatives of his company.

George Flannigan, formerly associated with various Denver and Casper, Wyo., newspapers, has been appointed to the new department of public relations recently organized by the Western Light & Power Company with headquarters at Boulder, Colo.

Yashuhige Hayashi, managing director of the Uji River Electric Company and vice-chairman of the board of directors of the Nippon Electric Company of Osaka, Japan, has been spending several days in California making a study of high tension transmission systems. Mr. Hayashi is especially interested in the transmission of energy at 220,000 volts.

H. H. Corey, member of the Oregon Public Service Commission, has been appointed to the Western states transportation committee, representing western shipping interests.

Walter A. Moser, manager of the Salt Lake City office of the Westinghouse Electric & Manufacturing Company, has been elected chairman of the advisory committee of the Rocky Mountain Electrical Cooperative League for the coming year. Mr. Moser was born in Union Hill, N. J., in 1886. He was graduated from the department of electrical engineering of the University of



WALTER A. MOSER

Nebraska with the class of 1907. He completed two years' apprenticeship with the Westinghouse Electric & Manufacturing Company in 1911 and entered the Salt Lake City office in the sales department the same year. He was made district manager in 1920. The Rocky Mountain Electrical Cooperative League is one of the important factors in the West which carries the electrical message to the public. During the coming year, under his direction, the league proposes to enter into new fields.

Obituary

Charles Perry Lindsley, vice-president of the Lindsley Brothers Company of Spokane, passed away at Hot Lake, Ore., Dec. 27, 1922, at the age of 55 years, after an illness of several months. Mr. Lindsley was also president of the Lindsley Brothers Canadian Company, Limited, at Nelson, B. C., and vice-president of the Barnes Lindsley Manufacturing Company, at Portland, Ore. He was one of the promoters of the Coeur D'Alene Electric Railway Company, the Pend d'Oreille River Navigation Company, and a pioneer in the lumber and cedar pole industries.

Frank Kivel, publicity manager of the Denver Gas & Electric Light Company for the last five years and prominently identified with utility advertising in the Rocky Mountain region, died in a sanitarium at Tucson, Ariz., Dec. 23, after a long illness. Mr. Kivel was a native of New Hampshire and his body was returned direct to his old home at Dover for burial. He was a member of the Psi Upsilon fraternity, a director of the Denver Advertising Club, a member of the University Club and of the Doherty Men's Fraternity, and also served on the publicity committee of the National Electric Light Association.

Manufacturer, Dealer and Jobber Activities

The Automatic Electric Heater Company of Warren, Pa., has recently started to make deliveries of its latest improved circulation type water heater. The construction of this heater differs considerably from previous models, in that the heating units are inserted from the top of the heater casting, instead of from the bottom. Another unique point in this heater is the use of separate 1,000-watt units instead of placing 3,000 watts all on one unit head assembly.

The Rawson Electrical Instrument Company, Cambridge, Mass., has recently issued Supplementary Bulletin No. 102. The bulletin describes the Rawson line of single-pivot meters. Descriptions and illustrations of the various types of portable testing instruments are contained in the bulletin.

The Esterline-Angus Company, of Indianapolis, Ind., has recently issued Bulletin No. 1122 which describes the necessity for making plant surveys.

The Westinghouse Electric & Manufacturing Company has recently placed on the market a new automatic sectionalizing contactor for railway and mining use that automatically cuts out of service feeder sections on which short circuits or overloads occur, and returns them into service again only when the trouble has been cleared. The contactor is entirely automatic in operation, opening on overloads and reclosing only when the potential difference between the feeder sections is sufficiently small to limit the flow of current on reclosure to less than the overload setting on a relay. An overload relay, a main contactor, a holding relay, a snap switch, fuses, a resistor, and terminals, are used in the construction of the new contactor.

The Youngstown Sheet & Tube Company, of Youngstown, Ohio, has prepared its annual calendar which gives illustrations covering the manufacture of steel in the modern plant. The calendar may be obtained by sending the company six cents in stamps.

The Manhattan Electrical Supply Company, Inc., of New York, has recently secured the services of K. M. Smith as general battery sales manager. Mr. Smith was formerly general sales manager of the Gould Storage Battery Company.

The Hart & Hegeman Manufacturing Company, of Hartford, Conn., has recently placed on the market a new line of push-button switches. The distinctive feature of the new switch is the star which is placed in the "current on" button. Gold star switches are marked with 14-karat gold stars and silver star switches have an "undark" star which is visible night or day. A solid close-fitting insulated dust cap is another improvement to the switch.

Graham-Reynolds Electric Company of Los Angeles, in accordance with their annual practice for the last five years, are distributing their 1923 calendars. The top piece of this calendar illustrates the transformation of the snow of the high Sierras into electric power for industrial Los Angeles.

The Electric Servant Company of Ogden, Utah, has filed articles of incorporation with the secretary of state. The capital stock is listed at \$10,000 in \$1 shares. Don L. Lenzi is president; Francis Cave, vice-president; A. K. Cross, secretary, and Edna I. Lenzi and Vera Cave, additional directors. The company will carry on an electric appliance business.

The P. A. Geier Company, of Cleveland, Ohio, has moved its executive offices, sales offices and service department from the St. Clair Avenue plant to its plant at 540-560 East 105th Street. The old office space thus available, amounting to over 15,000 sq. ft., will hardly more than relieve congestion, and provision for further enlargement is being contemplated.

The Uehling Instrument Company, Paterson, N. J., has just issued a 12-page folder which explains concisely the two biggest losses in the steam power plant, namely (1) the loss in steam turbine economy due to air leakage into the condensing system, and (2) the sensible heat in the flue gases lost up the chimney. A table gives data on steam turbine economy as related to the absolute back pressure. The Uehling combined barometer and vacuum recorder, as illustrated in the folder, is in effect an automatic log of condenser performance because it records the existing vacuum as well as the absolute back pressure for every second of the day. Data on combustion are given in another table, such as the variation of the chimney loss with the percentage of CO₂ and its relation to flame temperature and ratio of air to fuel supply.

The General Electric Company has presented in Bulletin No. 44018 the principal characteristics of the several great rapid transit systems from an electrical engineering viewpoint. The facilities for power production, transformation, transmission and utilization are outlined briefly for each of the systems in the cities of Boston, Chicago, New York and Philadelphia. The company has taken a most important part in the manufacture of various types of apparatus for use on all of these systems. Exhaustive engineering studies and tests have been conducted by trained engineers to insure to each railway company the selection of exactly the proper equipment for the most reliable and efficient operation. The booklet contains a history of the part played by the General Electric Company in railway electrification.

The Illinois Electric Company of Los Angeles, Calif., has moved from 261 South Los Angeles Street, to 313-315 South San Pedro Street. The new location gives the company a much larger floor space.

The National X-Ray Reflector Company, in its publication of Eye Comfort, has recently presented illustrated descriptions of the lighting installations in the Dixie Terminal Building in Cincinnati, Ohio. The article is a reprint from Electrical World.

The Wesix Heater Company, of San Francisco, has moved its sales office from the factory to the Rialto Building in San Francisco. By removing the sales office from the factory additional space for manufacturing purposes has been provided.



IT'S THE ATMOSPHERE THAT COUNTS

Seldom is it possible to photograph four such celebrities as these with such studious expressions on their faces. The expressions were induced by the super-educational atmosphere they have been surrounded with on the campus of the Oregon Agricultural College. They might be taken for professors. Reading from left to right, they are A. C. McMicken, sales manager of the Portland Railway, Light & Power Company, J. I. Colwell, manager of the Seattle office of the Western Electric Company, George Boring, manager of the Portland branch of the Pacific States Electric Company, and R. C. Kenney, manager of the NePage-McKenny Company's Portland office.

Trade Outlook

San Francisco

The year 1922 was one of fulfillment in that its early promise of being a fair year in trade and industry was abundantly justified. Satisfaction arising from the surge forward during the year as evidenced by the new peaks in building and allied lines, gives the basis for the feeling that this activity will continue well into 1923.

Bank clearings for 1922 mounted to \$7,274,000,000, an increase of \$645,000,000 over 1921. Building permits for 1922 totaled \$45,327,206, almost doubling those of the previous year. Frozen credits which prevailed a year ago have been liquidated, and financial relations are on a more normal basis.

Building activity has not shown any appreciable decline, and the construction of a number of new factories is about to start. Steel and furniture factories are working to capacity, and aluminum manufacturers expect a better year during 1923, as foreign competition is diminishing. Shipments of raw sugar from Hawaii during the year totaled 560,000 tons, and all of it came to this city to be refined.

Electrical supplies of all kinds show an increase in demand. The sale of water heaters has more than doubled during the year. A fair call is noted for radio supplies. In household appliances there is more competition than usual.

Denver

A successful wind-up to the electrical Christmas campaign and the completion of inventories has held the center of interest in this city during the past fortnight. Sales of appliances and all seasonal merchandise proved far beyond expectations and the results are primarily attributed to the intensive campaign sponsored by the electrical league here during the month of December.

Standard appliances were much in demand and with the depletion of new stocks, obsolete and cheaper appliances were moved in large quantities. Curling irons, percolators, and Christmas tree lighting outfits were cleaned out of dealers' stores and all jobbers report an unusually successful movement of merchandise. Sales are estimated as having been fifty per cent better than last year.

Through the ready movement of stocks, the taking of inventories has been facilitated. Orders on manufacturers have been placed anticipating a renewed activity in appliances early in the spring. Stocks in other lines are low due to the annual check-ups and with an unusually mild winter thus far continued good business is looked for.

Of unusual importance in the construction field will be the building of new schools, high and elementary, in this district, made possible by the passage of the bond issue last fall. Awards for the different buildings have been made to leading architects and the total program will cost nearly six million dollars.

Los Angeles

Nineteen twenty-three will be another great construction year for Los Angeles. Building projects already in sight aggregate in value more than the total for all building construction in 1920, which was a trifle over \$60,000,000. That was a new high mark, but it was eclipsed by 1921, with a record of approximately \$82,700,000, and 1922 rolled up the phenomenal total of \$120,000,000. Building permits for the last fifteen days of December, 1922, had a valuation of \$4,380,829—the number issued being 1,665, which is a gain over the same period in 1921 of approximately 25 per cent.

Bank clearings for the last 15 days of December, 1922, amounted to \$248,079,254.01, which compares with the same period of 1921, with \$206,202,267.17, as an increase of approximately 25 per cent. As has been fairly evident for some months would be the case, Los Angeles bank clearings for the year 1922 were over \$5,000,000,000, the actual total being \$5,152,311,839. This is an entirely new record, the figures being \$941,115,042 in excess of those for 1921. It was, in fact, a year in which not only the yearly, but the monthly, weekly and daily records for payments through the banks were broken. December's total of \$516,301,485 is the highest ever touched and compares with \$407,624,463 for the corresponding month last year as an increase of \$108,677,022. As December, 1921, was the first month in the history of the city when the monthly clearings crossed the \$400,000,000 mark, so December, 1922, is the first when the total reached \$500,000,000.

Salt Lake City

Dividends paid by Utah mining companies for the year 1922 show a slight increase as compared with those of 1921. While copper mining conditions during the year 1922 were unsatisfactory, the silver-lead producers had an excellent year. The ore output at Park City, Utah, one of the state's largest silver-lead camps, was greater during the past year than for any preceding year in the fifty years of the camp's activities. With the improved conditions in the copper situation, which now prevail, the mining industry in general will undoubtedly have a still greater period of activity during the coming year. Satisfactory mining conditions in the Intermountain section are reflected in greater prosperity for other classes of business and industry.

The retailers are now experiencing a lull after a very satisfactory holiday business. Electrical dealers are making strenuous efforts to "clean up" odds and ends and get rid of surplus stocks of various items in order to avoid carrying them over during the coming year. Practically all lines of trade, both wholesale and retail, report better business than last year.

Building activity has, of course, de-

creased very materially on account of winter weather. With the coming of spring, however, there will be more of such activity than for several years past.

Business men of this section are looking forward to 1923 with considerable optimism.

Portland

During the year just closed the Portland district showed in many lines the greatest activity in its history. All former building records were broken in 1922, not even excepting the high record made in 1910. The total value of all building permits for 1922 reached \$22,734,875, of which over \$12,000,000 was for dwellings. There are strong indications that the building activities during 1923 will be even more active than during the year just past.

The lumber industry has closed a profitable year. Due to the holiday period, during which many mills and camps are closed for general repairs, etc., the lumber production was light. Shipments continue somewhat below normal.

The clearings of Portland banks showed a comfortable gain over 1921 and totaled \$1,600,507,594 for the year.

Retail buying during the holiday period, due to unpleasant weather, was slow at first but became very active just before Christmas. Many merchants were able to make a greater volume of sales than a year ago. The electrical Christmas idea was adopted by more shoppers than ever before. Jobbers and dealers in general are looking forward to a bigger business in 1923.

The one discouraging feature in the present outlook is the condition of the farmer. He is discouraged and the belief is growing that some economic adjustment must be made to better his condition. Better methods of production, longer credits, and cooperative marketing are the remedies being suggested.

Seattle

Every condition entering into the industrial situation in Seattle and the Puget Sound country points to a continuance of the prosperity prevailing during the last half of 1922, with excellent prospects for even further progress along industrial and manufacturing lines. During the past year, many records were smashed in Seattle's business field.

Seattle's building statistics for the year show that all former records were shattered in 1922, with a total of \$19,784,010 in building permits issued. The building of homes has been the largest single item, with permits for approximately 2,000 dwellings issued during the year.

The electrical supply trade of the district reflects the general improvement in industrial and business conditions. Sales volume for the year, which mounted steadily during the last three months, greatly surpassed that of 1921. The number of large building projects started in the city, and the unusual activity in home construction, combined to swell the volume of equipment sales. Holiday buying in all lines was reported considerably heavier than in any previous year.

Construction News

Bridges

Ariz., Prescott—Roger Bros., Snowflake, were awarded contract by Yavapai County Highway Commission, at \$30,001, for constructing steel bridge across Agua Fria near Black Canyon.

Calif., Riverside—Bids are being received by county supervisors for constructing wood trestle bridge 323 ft. long over Coachella storm water channel on Jackson St., Indio, to be known as the Sparey Bridge. Plans and specifications on file at office of A. C. Fulmor, county surveyor; certified check, 5 per cent. D. G. Clayton, clerk of the board.

Calif., Hamilton—A. W. Kitchen, Piedmont, submitted low bid at \$88,238 for constructing reinforced concrete bridge across Stony Creek near Hamilton City, in Glenn County.

Calif., Los Angeles—City Engineer John Griffin has been instructed to prepare plans and specifications for a reinforced concrete bridge across Pacoima Wash at Mulholland Ave. The city will pay half the cost. The board of public works was authorized to call for bids for this work.

Calif., San Diego—Chas. S. Hardy, proprietor of a packing plant near Old Town, has proposed to the city council that the city build a \$50,000 bridge across the San Diego River at Old Town. He offered \$5,000 toward a bridge fund. The matter was taken under advisement.

Calif., Sacramento—The State Highway Commission has awarded a contract to O. B. Chaney & Sons, of Acampo, for the construction of a bridge over the Sacramento-San Francisco Short Line Railroad at Denver, Solano County, on their bid of \$12,540.

Ore., Portland—Work will be started soon on the new Ford Street concrete viaduct to replace the present bridge which gives access to Portland Heights and Council Crest. It will be about 500 ft. in length, with the main arch 250 ft. long and rising 90 ft. above Jefferson Street. The cost is estimated at \$140,000.

Wash., Spokane—The Trent bridge contract has been awarded to J. W. Doust, of Spokane, on his bid of \$60,370. The bridge is to be of cement and will be 422 ft. long. Construction is to start at once.

Wash., Vancouver—A new bridge is to be built across Salmon Creek on the Battle Ground highway. The cost of the bridge, which will be of steel and concrete, is estimated at \$100,000.

Wash., Olympia—The State Highway Department has under preparation plans for a steel and concrete viaduct across the east fork of the Lewis River on the Pacific highway. The bridge will be 1,000 ft. long, and is estimated to cost \$100,000.

Wash., Seattle—The Alaskan Engineering Commission, 422 Bell Street Terminal, will receive bids until Jan. 22, 1923, for furnishing one steel viaduct truss span and one steel girder span for various bridges on the Alaskan Railroad. The steel viaduct for bridge No. 1275 over Eagle River will be 308 ft. long, and will consist of two steel towers, two 40-ft. girder tower spans, two 74-ft. spans and one 80-ft. girder span. There will be one steel truss span for bridge No. 4679, over Noyes Slough, consisting of one through riveted steel span 124 ft. from center to center, and from end bearings. Bridge No. 2110 over North Channel of Montana Creek will require one steel girder span, the bridge to be a through steel span 60 ft. from center to center of end bearings.

Wash., Seattle—On a divided bid totaling \$406,317.78, submitted by three separate firms,

and complying with the plans and specifications embodied in specification No. 2, city design, the board of public works has awarded the contract for furnishing steel and the erection and completion of the superstructure of the West Spokane Street bridge, across the Duwamish Waterway, to the Bethlehem Shipbuilding Corporation, Ltd., the Gerrick & Gerrick Company, Seattle, and the Butte Electric & Manufacturing Company. The award to these three firms was made by the board following the reading of recommendations submitted by City Engineer J. D. Blackwell, who recommends the city design in preference to that of the Strauss Bascule Bridge Company. The winning bid of the three firms follows: Furnishing steel and delivering at bridge site, Bethlehem Shipbuilding Corp., Ltd., \$276,871.14; erecting steel, The Gerrick & Gerrick Company, \$106,151.64; furnishing electrical equipment, Butte Electrical & Manufacturing Co., \$23,295. There were four propositions on which the contractors were requested to submit figures, as follows: Prop. No. 1, either city design or Strauss design, provides for furnishing and erecting, complete in place, superstructure, machinery and electrical equipment; Prop. No. 2 provides for furnishing only, delivered at bridge site, superstructure and machinery of the bridge; Prop. 3 provides for furnishing the electrical equipment of bridge and installing same; Prop. 4 provides for the erection of the superstructure and machinery only. The bridge will comprise a double-leaf bascule span approximately 288 ft. center to center of trunnions, two approach spans each about 140 ft. long and a steel girder span about 136 ft. long. The width of the bascule span will be 45 ft. center to center of trusses and of the side spans 52 ft., center to center of trusses, and of the girder span about 40 ft. Involved in the construction will be 3,850,000 lb. of bridge steel and 320,000 lb. of machinery.

Buildings (Industrial)

Ariz., Needles—The Santa Fe Railway Company is having plans prepared by its engineering department for a new ice plant to be erected at Needles. Reinforced concrete construction, structural steel, cork insulation; \$250,000.

Calif., San Francisco—A permit has been granted to the J. D. and A. B. Spreckels Securities Company for the construction of what will be one of the largest warehouses in the West. The structure, estimated to cost \$245,000, is to be one story in height and of steel and concrete construction, covering two city blocks, along Twenty-third and Delaware Streets. The building is to be used by the Western Sugar Refinery Company, a Spreckels corporation.

Calif., Hollywood—Architect Wm. F. Bowen, 813 Union League Building, is completing revised plans for an ice storage building at Santa Monica Blvd. and LaBrea Ave., Hollywood, for Home Ice Company. Stucco exterior, 40 x 78 ft., steel construction, concrete slab roofing, 42 ft. high, maple and concrete floors, cork insulation, high pressure piping, elevator and conveyors, steel beams, cooling tower, ornamental iron; \$50,000.

Calif., Los Angeles—Architects S. Tilden Norton and Frederick H. Wallis, 330 Pacific Finance Building, are preparing plans for a 1-story warehouse to be erected on East 9th Street near Ceres Avenue, for Central Realty Company, Loew State Theater Building, Brick, 30 x 100 ft., pressed brick facing, composition roofing, cement floor, white enamel brick trimming, metal skylights, wire glass, Summerbell

roof trusses, steel sash. Owner will take bids soon.

Calif., San Francisco—Barrott & Hilp, 918 Harrison St., have been awarded a contract on a percentage basis to erect a two-story reinforced concrete packing plant building on the north side of Townsend St., east of Fifth. Plans are being prepared by Architects Ward & Blohme, 454 California Street, Ruth-Winter & Walsh are the owners.

Calif., Oakland—The Paraffine Companies, Inc., of Emeryville, Calif., has purchased forty acres adjoining its property at the foot of Powell St., thus giving it a total of 65 acres, according to Manager A. A. Irving, and in the near future will enlarge its present plant. N. R. J. Rich is in charge of personnel work at the Paraffine plant.

Calif., Los Angeles—The refinery which will be built on Mormon Island by the Pacific Borax Company at a cost of about \$1,500,000, will be an important addition to the industries at Los Angeles Harbor. The site is one formerly occupied by the Ralph J. Chandler Shipbuilding Company. Construction of the new plant will be started as soon as an order for the reinforcing steel has been placed. A 3-story reinforced concrete building, 305 x 250 ft., for the refinery has been planned by Architect A. C. Martin.

Calif., Los Angeles—Hamm & Grant, Ferguson Building, have completed plans and are commencing work on the erection of a 1-story factory building at 51st St., and Santa Fe Avenue, for California Enameling Company. It will be 300 x 600 ft., brick construction, steel sash, structural steel, composition roofing, cement floors.

Calif., Fullerton—Placentia Orange Growers Association plans to erect a pre-cooling and refrigerating plant on East Commonwealth Ave. Estimated cost \$150,000. A. Pritchard, manager.

Calif., Modesto—J. S. West, local agent and grain dealer, announces that he and his associates will build an ice plant for both retail and wholesale distribution. Estimated cost, \$40,000. The men are: J. S. West, Leslie High and N. S. West. A contract has been let.

Calif., Santa Ana—The Austin Company, 702 Pacific Electric Company, has prepared plans and has the contract to erect a 1-story laundry building at Santa Ana for the Southern Service Company. It will be 152 x 120 ft. with a wing, 45 x 120 ft.; steel frame construction, brick walls, pressed brick facing, plate glass, steel roof trusses, saw tooth roof, composition roofing, metal sash, cement floors; \$50,000.

Calif., Los Angeles—Comet Oil Company will build an oil refinery costing more than \$1,000,000 on East 26th St., near Downey Road. The company includes Adolph Ramish, Michael Gore, J. J. Gans, B. Rosenberg and others. The capacity of the plant, which will serve Santa Fe Springs, Huntington Beach, Signal Hill, and Montebello, will be 2500 barrels a day at the start. The company is capitalized for \$600,000.

Calif., Los Angeles—Union Ice Company of San Francisco, has applied to the harbor board for permit to erect a \$400,000 ice plant at Mormon Island, L. A. Harbor, according to Edgar McKee, president of the Harbor Board.

Mont., Stevensville—A canning factory to cost \$100,000 is to be built in the Bitter Root Valley, on the site of the canning factory which burned in October. This is at Bass Spur on the Northern Pacific Railway. H. A. Johns is president of the Beaver Canning Company and is promoting the plan.

Ore., Portland—The Hurley-Mason Company is constructing a 50 x 100-ft. building at East 17th and Center Streets for a nitrous oxide factory. The new plant is to be owned by the Portland Oxygen & Hydrogen Company and will represent an investment of \$35,000 to \$40,000. There is no other factory of this kind in the

Pacific Northwest, the product having been shipped from Ohio.

Ore., Medford—The Southern Oregon Bi-Products Company will build a factory west of the city limits on the Jacksonville Railroad for the evaporation of fruits. Construction work will be begun on the dryer building soon after the first of the year and will be in readiness for the next season's crop.

Ore., Portland—Forty acres of land located near the Montgomery Ward & Co. building and adjoining the new freight terminal are to be improved by the Express Building Company of San Francisco with a group of large wholesale grocery warehouses costing, with the site, in the neighborhood of \$2,000,000. Announcement of this development project was made by William C. Crittenden and E. Tropp, heads of the Express Building Company, who were in Portland recently in connection with the final transfer of the Wells-Fargo building from the San Francisco concern to Porter Bros., well-known railroad contractors. The 40 acres of land which are to be used as the site of the proposed building were taken by the Express Building Company as part of the purchase price of the Wells-Fargo building. Plans for the series of warehouses to be erected here are now being prepared, it was announced by Messrs. Crittenden and Tropp. They will cover an area of about ten acres and will contain a refrigerator plant, covered unloading station, so freight cars can always be under roof, as well as other modern improvements for the handling of a wholesale grocery business. Designs used for structures in San Francisco and Los Angeles will be adopted largely in the construction of the Portland buildings, it was declared.

Wash., Tacoma—Purchase of a 26-acre site of the old Tacoma Mill company and plans for the construction of a big lumber mill immediately have been announced by W. Yale Henry, formerly vice-president and general manager of the Clear Fir Lumber Company. A company has been incorporated, capitalized at \$240,000, under the name of the Henry Mill & Timber Company.

Wash., Twisp—The Fender Lumber & Box Mills, here, plan the erection of a box factory, work to begin immediately.

Wash., Tacoma—Work is progressing steadily on the entire rebuilding of the Carsten's packing plant, of reinforced concrete. Two or three years will be required in the rebuilding, because daily operations are being continued.

Dams

Ariz., Tombstone—Engineer W. C. Elliott has presented to the directors of the San Pedro Water Users' Association, an estimate of the cost of building the proposed Charleston dam and works. The dams to be built at Charleston, about 10 miles from Tombstone on the San Pedro River. An election for a bond issue will be held in the spring. The cost of the dam, canal laterals, and ditches is estimated at \$2,699,573.

Calif., Los Angeles—Public Service Department (Bureau of Water) has completed plans and specifications for a concrete dam to be built in Weid Canyon, back of Hollywood, to form a storage reservoir for serving the higher reaches of Hollywood now served by pumping. The reservoir will be connected with the main line of the aqueduct joining it at a point near the tunnel into Franklin Canyon on the line of the main supply. A siphon will bring the water over the grade of the reservoir, which is located about one mile east of the summit of Cahuenga Pass, at the head of Holly Drive. The dam which will form this reservoir will be a gravity section dam, arched for additional safety and will be 195 ft. high, between 800 and 900 ft. in length, 160 ft. at the base, 16 ft. at the top, with a 24-ft. roadway, the overhang being supported on false arches which

extend from the face of the wall to carry this additional width. Bids will probably be taken on sand and cement. All construction will be done by the Water Department forces under the direction of Chief Engineer William Mulholland. Preliminary work has been started on a road from the summit of Cahuenga Pass to the site.

Highways

Calif., Tulare—Tulare County Supervisors have plans under way for the construction of a 9-mile auto road connecting the north fork of the Tule River above Milo, with the south fork of the Kaweah River, east of Three Rivers, the gateway to the General Grant Park. County Surveyor Lawrence A. Moyer is making a survey.

Calif., Sacramento—Contracts have been let by the state highway commission as follows: For paving with asphalt macadam $8\frac{1}{2}$ miles between Granada and Yreka, in Siskiyou County, awarded to the C. R. Dennis Construction Company of McMinnville, Ore., on bid of \$158,645; the highway engineer's estimate was \$185,845. For grading about $9\frac{1}{3}$ miles between new and old county well at Plank Road, in Imperial County, awarded to George H. Oswald of Los Angeles on bid of \$143,055, as compared to the engineer's estimate of \$151,200.

Calif., Sacramento—The following contracts have been awarded by the state highway commission: Highway in Glenn County, between Willows and a point three miles south of Glenn, about 11.9 miles in length, to be graded and surfaced with gravel; awarded to V. R. Dennis Construction Company, McMinnville, Ore., on a bid of \$124,149.80. Highway in Placer County, between Roseville and Lincoln, about five miles in length, to be surfaced with asphalt concrete; awarded to J. A. Costello, Jr., San Francisco, on a bid of \$35,530. Highway in Fresno County, between Parfield Junction and Coalinga, about 8.9 miles in length, to be graded; awarded to C. Miles, Sacramento, on bid of \$120,803.25. Other contracts were awarded as follows: For 8.2 miles of grading and paving with asphalt macadam between Hollister and Pacheco Pass road in San Benito and Santa Clara Counties, contract awarded to the Granite Construction Company of Watsonville, on bid of \$131,752.35. For 14.2 miles of grading and paving with asphalt macadam between a point on the westerly boundary of Madera County and Califa, contract awarded to R. T. Shea of Riverside, on bid of \$193,648. For 7.4 miles of grading between a point three and a quarter miles southeast from the Hueneme road and the Rindge ranch in Ventura County, contract awarded to the Hauser Construction Company of San Francisco, on bid of \$598,085. Contract was awarded to Blumenkranz & Vernon, a Stockton firm, on a bid of \$141,275, calling for the paving with asphalt macadam of a little over eight miles on the main highway between Morrison's Crossing and a point one mile south of Marysville. The stretch to be covered was originally paved under one of the first contracts ever awarded by the highway commission. Contract was also awarded for the grading and paving with concrete of a section 1.8 miles long between Hercules and Rodeo. The work will be done by Louis Tangnon of Vallejo, on a bid of \$33,519.20.

Calif., Red Bluff—At an approximate cost of \$175,000, the federal government next season is to build $10\frac{1}{2}$ miles of the Susanville—Red Bluff state highway in the Mineral district. This is according to word received here through notices from the office in San Francisco of the district engineer of the United States Bureau of Public Roads. C. H. Sweetser, federal district engineer, states bids are to be advertised for about Feb. 1, and will be opened a month later. The work is to be done on a unit of highway about forty miles east of Red Bluff. The project, it is stated, consists of grading, structures unclassified, excavation of 150,000 cu. yd., and the building of one steel truss bridge of a 70-ft.

span. It is to be a combination station-man and team job.

Ore., Florence—Bonds to the amount of \$150,000 have been sold by Lane County to cover the costs of clearing and grading an 18-mile section of the Coast highway between Blachly and Rainrock. The clearing which is through heavy timber will start soon and will be done by the county on force account.

Ore., Eugene—Contracts for the construction of the Goshen-Lowell section of the Willamette highway, the Cheshire-Goldson section of the Florence highway and the Lost Creek bridge on the Willamette highway were recently assigned. In the order above named the contracts went to the Warren Construction Co., Goshen-Lowell section for \$82,571. A. C. Mathews of Eugene, the Cheshire-Goldson for \$40,920. E. D. Olds will build the Lost Creek bridge for \$9,033.

Ore., Salem—More than 80 miles of road work, aggregating almost \$1,000,000, has been ordered advertised for the Jan. 19 meeting of the state highway commission. The projects are as follows: Oregon caves road, Bear Creek section, grading, 3 miles. Hayden Creek—Jackson County line, surfacing, 9.8 miles. Grass Valley—Wasco County line, grade and surface, 20.2 miles. Klamath Falls—Keno, grade and surface, 11 miles. Tygh grade section of The Dalles-California highway, grade, 6 miles. Eugene-Goshen, resurface, 4.8 miles. Allen ranch—South, The Dalles-California highway, grade, 8 miles. Approach fills, Rhinehart overcrossing, 0.26 mile. Tumalo section, grade and surface, 1.4 miles. Cline Falls—Redmond, grade and surface, 5 miles. Port Orford—Sixes River, Roosevelt highway, grade 3.3 miles; surface, 6.1 miles. Dike section west of Coquille, Roosevelt highway, grade, 2.4 miles.

Wash., Tacoma—Pierce County Commissioners awarded the contract for 3 miles of paving of Bond Road No. 8, near Buckley, to C. H. Collins, Arlington, on his bid of \$57,797, the lowest of eight bids submitted.

Irrigation Projects

Calif., Oxnard—Zone No. 1 Mutual Water Co., and Zone No. 2 Mutual Water Co., will install 12 miles of concrete pipe on the old Montgomery walnut orchard and Balcom Canyon road on the east, within the next few months. The present companies originated with the Las Posas Water Company, but now are independent. These two companies will look after irrigation waters from the Simi Creek and wells near the creek. A large reservoir will be constructed near Somis, 15,000 ft. of steel pipe will be used in pumping water from Simi Creek and wells to reservoir. Cost, \$350,000.

Nev., Reno—The Carson Valley Irrigation District filed application with the state engineer for authority to appropriate sufficient water from the east fork of the Carson River to irrigate 24,000 acres. Permission was requested from the Department of Water of the Board of Public Works of California for authority to erect a storage reservoir at the headwaters of the west fork of the Carson River in Diamond Valley, Calif. The enterprise includes irrigation of 45,000 acres including 16,500 acres of reclaimed sagebrush land, with the lands located near Gardnerville and Minden. It will require about ten years to complete the reservoir, dam and canals, etc.

Ore., Bend—Contract for reconstruction of the central Oregon irrigation district main flume south of Bend has been awarded to the Warren Construction Company on a bid of \$136,098.90. Creosoted wood stave pipe will be used.

Wash., Yakima—Construction work on a pipe line from the Sunnyside canal to a point on Snipes mountain, where it will discharge into an open canal to be diverted to irrigate 1,600 acres of land on the Granger project will be started about Feb. 15. The pipe line will form

an inverted siphon, 13,800 ft. in length and 33 in. in diameter, and will cost about \$150,000. It will be reinforced concrete, built in eight sections with lock joints. Work will be carried on by the U. S. Reclamation Service.

Power Projects

Calif., Glendora—Southern California Edison Company has appropriated about \$20,000 to re-build local electric light and power system in Glendora. For the initial part of the program there will be required 60,000 ft. 3/16 in., 40,000 ft. 1/4 in. and 10,000 ft. 7/16 in. wire, 250 poles. Fred Schwartz, district manager.

Calif., Oakdale—With the adoption of the resolution approving the estimates of the engineers for the Melones reservoir and power plant, the total cost of which is fixed at \$3,750,000, the Oakdale and South San Joaquin irrigation districts will at once ask the state bond commission for approval of their plans and permission to call a bond election. Engineers Hartley & Wood filed a report approving the plans of Engineer A. J. Wiley, which was the final step needed. The total cost of the dam and of the rights-of-way, etc., is estimated at \$1,984,000, and of the power plant at \$1,516,000.

Calif., Long Beach—The Nevada-California Electric Corporation will spend more than \$8,000,000 within the next ten years in constructing new plants. Seven new hydroelectric plants which will give an added capacity of 46,500 hp., will be built to supply power to Nevada mining industries and agricultural districts in southeastern California.

Wash., Walla Walla—The Pacific Power & Light Company plans the expenditure of approximately \$500,000 in improvements to its properties during 1923, according to C. S. Walters, manager. The most important of the improvements planned is construction of a new transmission line from Pasco to Pendleton, to connect with the 25,000-volt line from Pendleton to Walla Walla, insuring double service in Walla Walla. This improvement will cost \$450,000. Other expenditures planned are \$10,000 for reconstruction of part of the local distribution service, \$25,000 for rebuilding the pipe line at the Walla Walla River plant, and \$13,500 for smaller improvements.

Wash., Okanogan—A power line is to be built by the Washington Water Power Company into Chelan and Okanogan counties from a junction with the end of the present Big Bend line at Coulee.

Wash., Colville—The Stevens County Power & Light Company will extend its wire service for three miles south of Kettle Falls.

Railways

Calif., Los Angeles—Continuing its policy of linking Los Angeles and Chicago with two distinct parallel lines, the Santa Fe Railway has approved the immediate building of a double track between Dagget and Bagdad, desert stations in San Bernardino County, a distance of 68 miles at a cost of \$3,000,000. This will be the greatest extension program in the Santa Fe's history in California since the laying of the transcontinental line.

Calif., San Francisco—Contracts for construction of 5,030 standard refrigerator cars for the Pacific Fruit Express Company have been awarded, according to announcements by C. M. Seerist, vice-president and general manager of the company. Of the 5,030 cars, 1,030 will be constructed in the West, the Pacific Car and Foundry Company of Portland and Seattle getting the contract for that number. The Pacific Fruit Express Company in 1923 will have between 28,000 and 29,000 cars to be used in the fruit and vegetable business originating in the states of California, Oregon, Washington, Idaho, Utah, Colorado, Arizona, Texas and Louisiana, on the lines of the Southern Pacific and Union Pacific, joint owners of the Pacific Fruit Express Company.

Calif., Oakland—The San Francisco-Oakland Terminal Railway Company has closed a contract for the purchase of 55 all steel street cars to cost approximately \$800,000 with the American Car Company of St. Louis. The cars will be equipped with the latest proven safety devices. They are to be delivered in April or May.

Calif., Glendora—Ordinance No. 234, passed by board of trustees, granted Pacific Electric Railway Company a permit to construct an electric railroad and spur over Dalton Avenue, North Benna Avenue, Foothill Blvd., East Ada Ave., etc.

Colo., Denver—Allison Stocker has been awarded contract to build car barns for the Denver & Interurban Company at 36th and Fox Streets; price, \$35,000.

Wash., Yakima—Two hundred thousand dollars will be spent by the Northern Pacific Railroad in construction of new freight and passenger stations in the Yakima Valley next year, according to Harry Glen, general agent. They include a freight and passenger depot at Harrah, \$6,000; a combination at Wapato, \$50,000, and a new freight depot in this city.

Streets and Sewers

Calif., Watts—J. G. Beckjord, 718 San Fernando Building, Los Angeles, was awarded contract at \$445,000 for constructing city sewer system, under new proceedings. The contract was previously awarded to Thompson & Packard, of Salt Lake City, but owing to errors in the proceedings, they refused to sign the contract. Old proceedings were then abandoned and the new resolution adopted Nov. 14.

Calif., Fullerton—The bond issues for outfall sewer carried at the recent election. The \$75,000 issue was to pay city's share of cost of joint outfall sewer to the ocean. The \$175,000 issue was for sewer line connecting with the Anaheim main line to joint outfall to be constructed by the cities of Santa Ana, Anaheim, Fullerton and Orange.

Calif., Coronado—City Manager Hyatt has recommended the installation of a septic tank costing approximately \$25,000 as one way to solve the sewer problem of Coronado. The city manager has been authorized by the trustees to secure all necessary information on costs and material.

Calif., Claremont—Olmsted & Gillelen, Hollingsworth Building, Los Angeles, have submitted to city council an estimate of the cost of the proposed sewer outfall to care for Claremont for 40 years. The estimate totals \$139,000 and includes \$99,000 for lateral system, \$27,000 for outfall, and \$12,000 for disposal plant to be located in the San Antonio Wash. Specifications call for main outfall sewer of 18-in. pipe, two main lines 10 and 12 in., and laterals, 8 in. in diameter. W. S. Smith, city engineer, Claremont, has the matter under advisement.

Calif., Los Angeles—Board of Public Works has requested City Council to grant permission to sell \$2,000,000 of \$12,000,000 sewer bond issue voted last August. Of this sum, \$795,000 will be required for the temporary outfall and first three units of the emergency treatment plant or the extension of the pipe line to the sea in the case Venice will join Los Angeles in this disposal; \$181,000 for Section 2 of the north outfall, which is for grading the Hyperion treatment plant site; \$192,000 for screens, concrete and connecting sewers for south plant of Section 3.

Calif., San Diego—City council has decided to call a \$3,000,000 bond election in the spring to install new water mains in San Diego.

Calif., San Francisco—The West of Powell Improvement Association has decided to replace gas lamps with electric lights on Turk Street from Market and Mason Streets to Van Ness Avenue, and on Eddy Street from Powell and

Market Streets to Jones Street. D. L. Randolph is president of the association.

Wash., Seattle—A bill passed by the city council recently provides for the regrade of the north end of Beacon Hill, from Dearborn Street to Judkins Street, at an estimated cost of \$750,000. The bill also provided for the filling of Ninth Avenue South and other streets and avenues in the district, with the material sluiced from Beacon Hill.

Wash., Seattle—Contract for paving of Eleventh Avenue North, et al., has been let to R. G. Stevenson, on his bid of \$25,859. Mr. Stevenson, on his bid of \$14,210, was awarded contract for water mains in 24th Ave. N. W., et al.

Wash., Seattle—Contract for drainage system in Wetmore Slough, providing for covered ditches at Genessee Street and open ditch in garbage fill, has been let to Thomas Hansen, on his bid of \$19,005.

Wash., Seattle—For the second time, the contractors on the Alki Avenue paving project, involving more than \$100,000, have been released from their contract, and new bids will be called within 30 days for the work. In both cases technicalities in passage of the ordinance caused the release.

Wash., Tacoma—The proposed South Tacoma sewer project, estimated to cost \$950,000, has been indefinitely postponed by the city council, following a storm of protest from property owners in the district.

Waterworks

Calif., San Bernardino—City council passed Ordinance No. 933, which calls for a special election to be held at San Bernardino, Jan. 25, to vote on \$140,000 water bond issue. These bonds will be used for erection of water works, pumping plants, wells, reservoir, etc.

Wash., Jefferson—A bond issue of \$15,000 has been voted by residents of this city for improvements to the water system.

Wash., Mukiteo—The main distribution system of the Mukiteo water district has been completed by H. W. Troutmann Company of Seattle, at a cost of \$13,000. The completed system includes mains laid in the town proper, and a pumping station, but does not include the entire system, for which \$57,000 was voted, and which contemplates the laying of mains south of Mukiteo for agricultural districts.

Wash., Aberdeen—Bids will be received shortly by the city council for over 5,000 lin. ft. of 16-in. cast iron water pipe, to be used in installing an additional central service main to be extended from the reservoir to feeders which extend to every point in the city's water system.

Calif., San Rafael—The Pacific States Gas & Electric Company is contemplating improvements to its local plant, which will include changing present storage holder, the erection of a new 500,000-cu. ft. holder, the erection of a new warehouse, machine shop, garage, meter shops, transformer shed, filling station, etc.; the cost is estimated at \$139,600. An 8-in. gas main from the San Rafael gas plant to Petaluma will be laid, to cost approximately \$215,750.

Ore., Wehah—A cement plant is to be erected in this vicinity as a result of the decision of the public service commission fixing the rate of shipment at 17½¢. per 100 lb., the minimum carload to be 80,000 lb. The cost of the new plant will be approximately \$1,000,000.

Wash., Bremerton—(Pier)—Henry & McFee, general contractors, Northern Life Building, Seattle, with figures of \$440,000 and \$392,000, submitted the low bids to the Bureau of Yards and Docks, navy department, Washington, D. C., for the construction of the proposed extension to Pier No. 4 at the Puget Sound Navy Yard, Bremerton. The only other bidder, J. A. McEachern Company, Inc., Colman Dock, Seattle, bid \$473,000. The project involves the construction of an extension 720 ft. long and 80 ft. wide, of reinforced concrete construction, on concrete cylinders.

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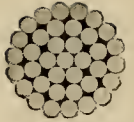
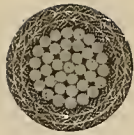
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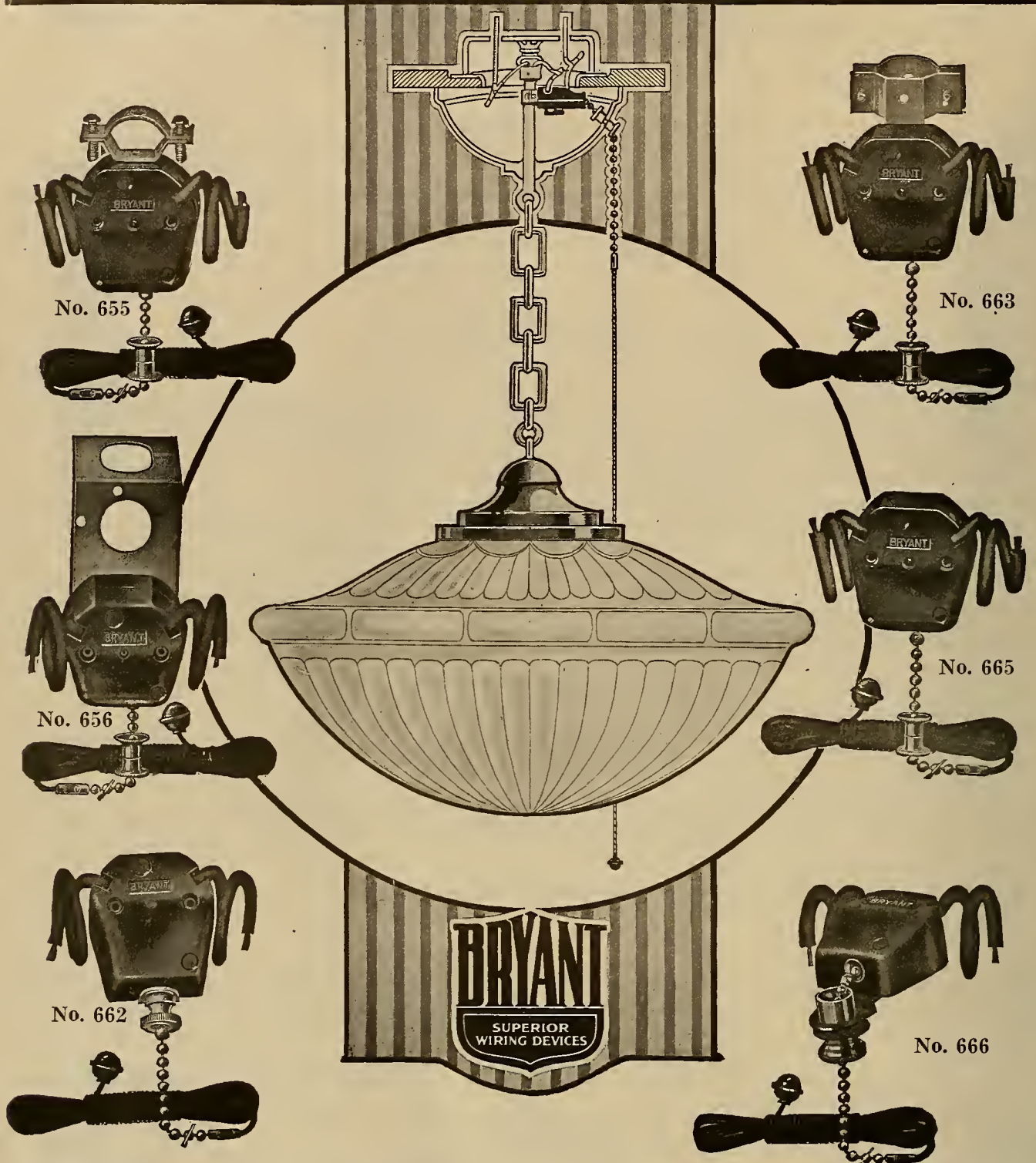
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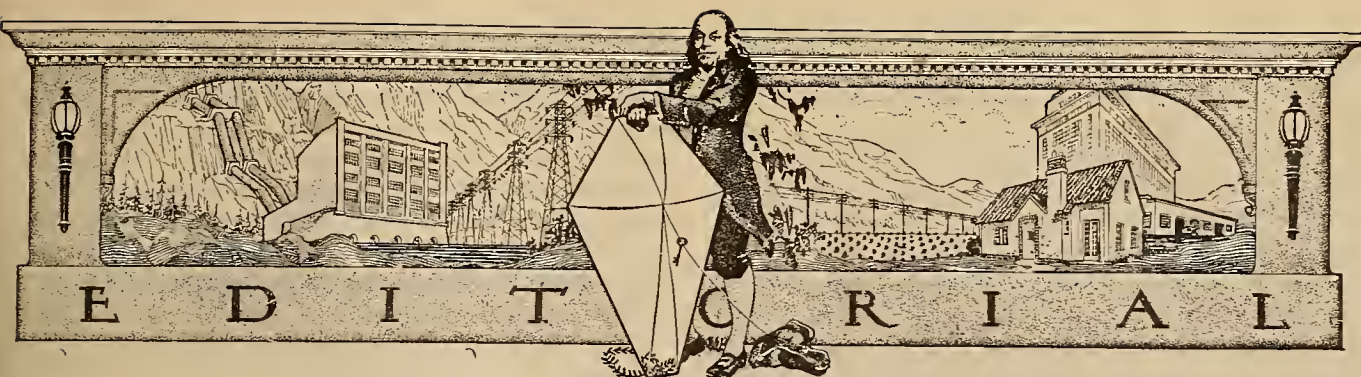
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Electricity and Progress

IN ITSELF, the word "progress" connotes a forward movement. Progress, however, means more than that. The movement must be not merely forward; it must be toward better things. In this sense electricity is synonymous with progress. The history of electrical development is a record of constant betterment of the condition of mankind. Progress and moral advancement have been and always will be a problem of the ages, as slow to come as the reactions of human nature. But the past fifty years have borne witness that a single generation can forever leave its impression upon the world's economic condition, vitally affecting the welfare of mankind. There never was a time in human history where there was so much to be done and when we knew so well how to do it. Electricity will provide the means. Electricity has become one of the most important elements in our daily lives. Progress in almost every line of industry is predicated upon it.

TODAY, the chief factors governing electrical progress are known within a reasonable degree of accuracy. One of the established facts is that the United States can use to advantage all of the electrical energy that can be generated within its borders. Everyone concedes the superiority of electricity for lighting, for driving industrial and mining machinery, for producing heat for industrial processes, for the manufacture of many chemical compounds, for supplying power on the farm, for

cooking, heating and operating a variety of labor saving devices in the home, and for every form of transportation. The potential demand will beyond doubt always exceed the supply.

WHILE the United States is the most highly developed country electrically in the world, only 35 per cent of the population is enjoying electric service. In the West 73 per cent of the population is served by electricity. Interconnected power lines, discussed in other sections of the country, are an accomplished fact in the West and a full use is made of the greatest, cheapest and most obliging servant in the world. Nature, in what might be regarded as an effort to compensate the West for the oversight in failing to provide local deposits of steam and coking coal, blessed us with an abundance of potential water power. Thanks to the initiative, indomitable will and faith of the western people, leadership in the development of hydroelectric power is overwhelmingly in the territory contiguous to the Pacific Ocean. This leadership is not confined merely to the development of the power, but also to its application to industry and especially to the home.

EACH year unfolds its story of accomplishment. As mechanical energy supplants the work of many hands, production is increased and the wastes of war and social disorder are neutralized. The West can well be proud of its part in creating new national wealth; in showing the way to better the condition of mankind.

Manufacturers Are Accorded

New Rights Under Current Tariff Act

NEW and highly important rights have been accorded the American manufacturer under the Fordney-McCumber tariff act, and electrical manufacturers and producers should be prompt to avail themselves of these privileges.

For the first time in history American manufacturers and producers are put on the same legal footing with importers and can intervene in upholding the integrity of the law. Heretofore manufacturers have been denied effectual participation in the construction of tariff acts. Also, despite the fact that a protective tariff vitally affects the immediate interest of three parties, the Government, the manufacturer and the importer, the manufacturer has never been accorded the right of contesting rates of duty and constructions of the tariff law. The importer has, on the other hand, been empowered to protest against any appraised value, or any rate of duty, or any construction of that law, as applied to any imported merchandise.

These rights are granted by the current act, as well as the right to oppose importers' claims. It therefore behooves every manufacturer to be vigilant and assert and defend before the customs officials and courts the protection accorded him by the existing law.

Regulation Held to Be Only Bulwark

Between Individual Enterprise and Socialism

A FAMOUS novelist, writing in a current magazine, advises a philosophy of life founded somewhat on pessimism. He says in effect that that one should anticipate the worst; if one loses, as much was expected; if one wins, one knows the intense joy of surprise. The content of the average daily newspaper, filled as it is with hypocritical pap calculated to appeal to the emotional reader, is enough to insure pessimism in anyone. One grows to expect the worst. "The intense joy of surprise" fittingly describes the immediate reaction to an editorial differing from the unusual run.

An example in point is an editorial appearing in the Denver Times, of recent date. "Efficient, equitable public regulation of utilities is the only bulwark now remaining between individual enterprise in transportation, power, light and heat, and government or public ownership," says this paper in commenting upon an address by Carl D. Jackson, former president of the American Association of Public Utility Commissioners and for many years a member of the public utilities commission of Wyoming. Mr. Jackson, who has been speaking before Colorado state educational institutions and groups of Denver business men, has drawn forth considerable comment in the press.

The Times goes on to state that "Public ownership is looked upon by many as the universal panacea for many economic ills. It destroys personal and private initiative, creates a bureaucratic form of administration and tends toward inefficient manage-

ment because the public is obligated to make up any deficit which may occur, due to poor executive leadership and lack of business ability. Private enterprise must be successfully carried out in order to survive; public business is, on the other hand, notoriously lax, extravagant and wasteful. Conditions in any city hall in the United States of America confirm this statement. And, of course, public ownership throws public utilities into politics.

"Granted the right kind of commissioners, regulation offers the public the best guarantee of adequate service by utilities. Such men, however, should be experts and not politicians, endowed with independence and courage and concerned in making just, rather than popular decisions, for upon their judgment and integrity depend not only the interests of the consumer, but the legitimate success of the producer. Their failure means another step in the consummation of the dreams of the Communist."

The Journal of Electricity and Western Industry has consistently held that industrial, financial and economic stability are predicated upon sane utility regulation. The Denver Times is to be complimented on its constructive stand.

Washington Bill Would Permit Cities to Operate Beyond Municipal Limits

UNDER the terms of a bill introduced in the Washington State Legislature, Seattle and other cities owning electric plants may be authorized to sell electric energy outside their corporate limits provided 5 per cent of the gross receipts of such sales are credited to the county current expense fund in the county where the sale is made. The bill is designed to permit Seattle, Tacoma and other municipalities to market their surplus power and at the same time to make such sales a source of revenue to the counties where the power is consumed.

The bill further provides that the auditor in the county where the power is sold shall have access to the books and records of the city or town furnishing the current for the purpose of determining the amount of revenue to be paid into the county treasury. Immediately after presentation of the measure in the legislature, a fight, sponsored by the municipalities interested, developed over the 5 per cent tax clause and a second bill has been presented with this item removed.

To permit municipalities to sell power outside their corporate limits is manifestly discriminatory, but should this step be taken it is only just and right that some form of tax be levied upon them.

Diagnosis of Our Political Troubles Discloses Ignorance and Selfishness

IT IS becoming evident every day that the body politic is subject to more ills than the flesh. There is also the increasing difficulty of properly diagnosing and prescribing for our political troubles. Too many cooks spoil the broth, and too many doctors in the political world make the condition of the patient more dangerous.

We all have a fairly good idea of what the disease is but our diagnoses differ and we cannot agree on a cure. However, the situation owes, if not its origin, at least its growth to the ignorance of the people in matters political, economic, financial and industrial. Ignorance in itself is not a serious disease, but it is dangerous.

Government is today not merely the enforcement of laws for the safety of the citizen. It is a complicated mechanism upon which man relies for his prosperity as well as his protection, and, in fact, it is a supreme although indefinite paternal being to whom he turns with his troubles and his problems. Consequently, the problems of government are enormous. The possibilities of error are multiplied. The certainties of criticism and irritation have become innumerable and the ignorance of the people as to the limitations of their government and its power make for chronic trouble. This also makes it easy for the unscrupulous propagandist to paint pictures of a future in which the present form of government is destroyed and his vaporous theory of a millennial government has become an actuality.

We have men entrusted with power who are not fit either by training, conscience or patriotism to have even a voice in the affairs of the government. It is only because of lack of understanding that radicalism grows—for radicalism is composed of two powers: one is the shrewd maneuvering of selfish intelligent men, with the power of eloquence to sway unreasoning followers; the other is the man who, being irritated and resentful, is willing to accept any promise which conveys to him the possibility of a return to easier conditions. If he had knowledge of simple economics he would never be a party to the apparent growth of radicalism. It is obvious that to prevent the spread of radicalism the causes for that resentment must be eliminated. The causes, as already pointed out, are ignorance of simple economic truths, and with education and knowledge of facts there would be no resentment. Education is therefore more necessary than ever before, education which will teach men and women the simple truths of economic laws. If our political national control passes into the radical group during the next two years, we and we only are to blame.

Chronological Tabulation of Western Hydroelectric Plants

ON ANOTHER page in this issue appears a tabulation listing the important hydroelectric plants installed in the seven western states since the inception of the industry. The data contained therein have been compiled from reliable sources and are believed to be correct. Many isolated plants of small capacity, concerning which complete information could not be obtained, have been omitted. A complete tabulation listing every plant, and containing additional information, is planned for a subsequent issue. This work will be facilitated if readers will advise us of any corrections or omissions noted in the present table.

Integrity of Federal Power Act Should Be Preserved

A WARNING is sounded in the second annual report recently issued by the Federal Power Commission which should not be disregarded by those interested in the development of our water powers. The report refers to movements on foot in several quarters to secure for certain sites or streams special legislation. These, if approved, would constitute a partial repeal of the Federal Water Power Act, and would eventually result in the progressive disintegration of our present national water-power policy. Requests that rights or authorities be granted independently of the present law are obviously made to avoid complying with essential features of the act, particularly those designed to protect the public interest.

Furthermore, to quote the report, "the granting of special privileges to favored interests would clearly discriminate against those who, in the faith that Congress had at last fixed its policy, are investing hundreds of millions of dollars under the obligations of the Act." It would be a serious mistake to permit the policy of the Act to be essentially modified except after fair trial and convincing evidence of the desirability of change. The Act has proved successful; there is no need for modification. Essential justice demands, however, that any modification made should be a change in the general law and not special legislation applicable to a particular site.

Pacific States Electric Company to Continue "Check" Seal Campaign

THE first year of the "Check" Seal program, inaugurated by the Pacific States Electric Company, has, in the opinion of company officials and others, proved the soundness of the principles upon which it is based. In fact, its measure of success is such that not only has the company decided to continue the program, but to expend greater efforts in bringing the principles it represents to the attention of the public.

Electric household appliances are still regarded with a certain amount of distrust and apprehension by many consumers. For the most part, electricity is a mystery to the layman. Lacking in knowledge of electricity, its technology and terminology, the average buyer has had little or no personal method of discriminating between the relative merits of electrical appliances and electrical installations. The program to establish a trade mark as a means by which the public can determine quality is an interesting step in overcoming the sales resistance due to a lack of knowledge of the finer points of electrical appliances and electrical construction.

The success of the program is not only of direct interest to such contractor-dealers and companies as are personally concerned, but the subsidiary effect in producing a more receptive attitude on the part of the public,—and, it may be added, a wider understanding on the part of the electrical fraternity itself, is a distinct contribution to the general progress of the industry.

CURRENT COMMENT



The total value of the mineral production of California for 1922 is conservatively estimated by the statistical division of the State Bureau of Mines to have been \$257,351,690, a decrease of approximately \$10,805,000 over 1921, due largely to the lower prices prevailing for crude petroleum and an apparent decrease of almost a million dollars in the gold yield. Petroleum with a record yield of 139,000,000 barrels, represents \$191,000,000 of the total of the state's mineral output.

California Mines Show Record Output for 1922

Copper furnishes cause for optimism with a yield almost double that of 1921, owing to resumption of activity in the mines after almost a year of idleness. Silver production will approximate that of 1921 while lead, zinc and quicksilver will show slight increases. The estimated quantities and values for 1922 follow:

| | |
|-----------------------------------|--|
| \$14,900,000 | gold. |
| 3,200,000 (3,200,000 fine oz.) | silver. |
| 3,035,100 (22,650,000 lb.) | copper. |
| 356,250 (6,250,000 lb.) | lead. |
| 206,340 (3,620,000 lb.) | zinc. |
| 217,000 (3,500 flasks) | quicksilver. |
| 58,500 (650 fine oz.) | platinum. |
| 191,000,000 (139,000,000 bbl.) | petroleum. |
| 5,250,000 (75,000,000 M. cu. ft.) | natural gas. |
| 33,000,000 | brick, cement, building stone, crushed rock, etc. |
| 2,750,000 | miscellaneous "industrial" minerals. |
| 2,750,000 | salines (including borax, potash, salt, soda, etc.). |

The thirtieth anniversary of the opening of the first polyphase hydroelectric plant equipped for long distance transmission, Mill Creek No. 1, operated by the Redlands Electric Light and

Celebrate 30 Years of Hydro Progress

Power Company, was recently celebrated by the Los Angeles Electric Club. At present a unit in the system of the Southern California Edison Company, the plant is functioning today just as it did thirty years ago. No better idea of the progress which has been made in hydroelectric development during the past three decades can be gained through a brief resume of the history of this first plant.

The Redlands Electric Light and Power Company was incorporated Oct. 6, 1892 by Messrs. H. H. Sinclair, George B. Ellis, George H. Crafts and Fulton C. Feraud. The site chosen for the plant was on Mill Creek, about eight miles east of Redlands. Their

consulting engineer was A. W. Decker, an electrical engineer whose vision led him to adopt methods far in advance of those which obtained at that time. Owing to the distances over which it would be necessary to transmit the power, Mr. Decker insisted upon installing a three-phase system similar to the one being operated for experimental purposes in Tivoli near Rome. Plans and specifications were prepared and submitted to electrical manufacturers, but it was only after some months and considerable effort that they could be induced to bid on the installation, the manufacturers recommending the use of such apparatus as was standard at that time.

The General Electric Company finally agreed to build two 250-kw. three-phase generators which were installed in the plant at Mill Creek. These generators and some of the original motors connected to the lines, the first of the kind ever turned out by the General Electric Company, are still in daily service and operating in parallel in perfect accord with the latest creations.

The waters of Mill Creek used for turning the Pelton water wheels which were connected to the generators were diverted at a point approximately two miles above the plant, and conducted through a thirty-inch steel pipe line, a distance of 10,250 ft., where they were dropped into the power house under a head of 530 ft. Energy was carried over a high voltage transmission line four and a half miles to the plant of the Union Ice Company at Crafton and thence three and a half miles further to the city of Redlands.

Later water was diverted at two other points along the canyon and plants No. 2 and No. 3 constructed.

On April 19, 1897, the Southern California Power Company was organized for the purpose of utilizing the waters of the Santa Ana River for the generation of power. Shortly after this the Redlands Electric Light and Power Company was merged with the new concern and ultimately both became part of the system of the Southern California Edison Company.

The ambition of the Redlands Electric Light & Power Company was to furnish electricity to the city of Redlands for domestic and commercial purposes. The first installation was for the generation of energy at 2,500 volts, carried at a like voltage on the transmission line to the city and stepped down to 110 volts wherever the occasion demanded. Shortly

after this the voltage was raised to 10,000 volts and power transmitted to the State Hospital at Patton.

The current was turned on the arc light system in Redlands for the first time on Aug. 5, 1893. The occasion is best described in the following quotation from the local paper:

"At 7:30 the carbons began to glow and in a moment the long looked for, eagerly anticipated lights were illuminating the business part of the town with a brightness hitherto unknown after the sun had set. Three lights were in operation, one each at the intersection of Water and Orange, State and Orange streets and Citrus avenue and Orange street. The first two are suspended over the middle of the street, while the latter is on a shaft about fifteen feet in height. The lights are very brilliant and steady and the effect perfectly satisfactory to all. Chairs were brought from the Y.M.C.A. and planted under the light at State and Orange and the band celebrated the event of the evening by a concert in its best style."

The passing of thirty years has witnessed stupendous development in hydroelectric generation, not only in California, where this pioneer plant was located, but throughout the entire West. Mill Creek No. 1 with its 250-kw. units and its 10,000-volt transmission line, has given away to plants with 35,000 kw. and transmission lines with voltages ranging up to 220,000.

California utilities are keeping abreast of the needs of a rapidly expanding state, according to development statistics contained in the annual report of the State Railroad Commission. This is indicated by the large increase during 1922 in securities authorized for additions and betterments, according to the commission, which says:

"This year's authorizations for additions and betterments amounted to \$148,925,206.53, compared with \$94,124,945.91 for the preceding period, or an excess of \$54,800,260.62. That development is not only continuous but at an accelerated pace is shown by the fact that 1921's gain over 1920 in securities for development purposes amounted to \$34,711,173.35.

"For all purposes securities authorized this year aggregated \$188,401,250.99 as against \$168,497,596.91 for the preceding year. Next to that for additions and betterments the largest item was \$19,075,793.06 for refunding purposes. This was due to declining interest rates, the reverse of the case in the past several years when interest rates were high. Accordingly a number of the utilities took advantage of the situation to refund high interest bond issues.

"With the marked decline in interest rates there occurred a corresponding increase in the prices of public utility stock and bonds. This condition was not peculiar to California, but marked a national and even world-wide readjustment. The lowering of in-

terest rates has been of material benefit to California utilities and to rate-payers. As the rates must necessarily be based on future conditions, this tendency was reflected in rate computations.

"The commission kept in close touch with the fall in interest rates and the advance in the price of securities, and in accordance with this movement governed its action on passing on new securities. Proposed interest rates were cut and the minimum selling price of stock and bonds advanced in a number of cases to bring them in line with conditions as reflected in the market quotations."

The demonstration of a new and unique method of communicating and broadcasting over electric light and power lines, by means of General Squier's system

Wired Wireless Is Successfully Demonstrated

of "wired wireless," at the Bureau of Standards in Washington recently, indicates that within a short time all consumers of electric current may be able to plug in their radio sets to their lamp sockets and receive information and entertainment broadcasted by the large light and power companies. The system is controlled by the North American Company of New York, which owns and operates the lighting utilities of Cleveland, Milwaukee, St. Louis and a number of other cities and which has secured an exclusive license number under General Squier's patent rights for this purpose and is now developing the plan.

With the aid of a small condenser in series with vacuum tube receiving sets, or a special plug, consumers of electricity will be able to receive broadcasts from their electric wires just as they get energy to operate the flat iron, electric toaster or hair curler today. One button will produce "jazz," another news and a third grand opera, as soon as the power companies start broadcasting over their wire systems. The ether will in no way be disturbed by this sort of direct radio broadcasting, and Secretary Hoover will not have to assign wave lengths or worry about interference with other stations using the ether—there will be no interference as the air is not used.

With the aid of a regulation broadcasting set at a substation of the Potomac Electric Power Company, messages were transmitted, recently, over this company's lines, carrying 2,400 volts of alternating current, to the signal corps laboratory, Bureau of Standards in Washington, where they were received by means of a tube set coupled with condensers. The sending station was located at Georgetown. The wave which followed the wires was of 5,000 meters or 30,000 cycles and a transmitting current of 0.050 amperes was employed.

Following tests of General Squier's invention in Cleveland last May and further trials in New York in August, the North American Company concluded that a practical application of the system was of value and would permit the furnishing of an additional important service to lighting and power customers.



OUT of castles in the air which found their first materialization in such as the Rome Plant of the Nevada Power Company in 1896, have grown the huge generating stations of today, of which this Big Creek No. One of the Southern California Edison Company is typical. Throughout the years the West has consistently led in hydroelectric development.



JOHN A. BRITTON

Pioneering In the Central Station Industry

San Francisco Had the First Central Station in the World

By JOHN A. BRITTON

Vice-President and General Manager, Pacific Gas and Electric Co.

WIDESPREAD publicity, through the daily as well as the technical press, has been given during recent years to three important points in connection with the leading part California has played, and continues to play, in the development of the electrical industry not only in the West but the entire country:

(1) California leads the country in hydroelectric development as measured in kilowatt hours output; (2) California leads the country in the per capita consumption of electric energy; (3) California was the pioneer of the entire world in hydroelectric development of electricity for commercial purposes. A fourth point, however, appears to have escaped general observation. That is, California established and operated the first electric central station in the world. This was in San Francisco in the year 1879.

It is of great importance, it seems to me, that in view of recently published statements elsewhere, this point should be clearly established to the satisfaction of all those who, directly or indirectly interested in the electric industry in our country, wish to see the details of its progress and development historically accurate.

There can be no question of the justice of San Francisco's claim to the first central station. For the benefit of all interested I present the facts as they stand. They appear in a brief history of the rise and development of the electric light industry in San Francisco compiled under my direction by Mr. Charles L. Barrett, who has been a prominent figure in the public service in San Francisco all his life. No more painstaking investigator ever collected facts to lay before the public.

THE first public street exhibition of electric lights and lighting in San Francisco took place upon the evening of July 4, 1876, the opening day of the Centennial Exposition at Philadelphia. On that evening three large French arc searchlights, operated and erected by the Reverend Joseph M. Neri, and located upon the north end of the roof of St. Ignatius College, which stood upon the south side of Market Street, between Fourth and Fifth Streets, were exhibited to the public. The machines used to generate the current were an old French machine used at the siege of Paris, 1871, a more modern Brush machine, and one of Father Neri's own make. The town turned out en masse to see the light effect, which at the time seemed wonderful. Father Neri, a renowned investigator of physical subjects, also lectured upon and conducted exhibitions in the public hall of St. Ignatius College with the Jablackoff candle, an electric light which promised "to revolutionize" the lighting of the world.

At the annual fair of the Mechanic's Institute at the Mechanic's Pavilion in the fall of the year 1879, there was exhibited the first commercial arc lighting in San Francisco. This was done in two separate exhibits, the exhibitors being the Brush Electric Company, whose machines were used to operate the lights, and the California Electric Light Company, which exhibited lights and other apparatus.

On June 30, 1879, the California Electric Light Company was incorporated with a capital of \$5,000,000. This incorporation grew out of a transaction by which the firm of Roe & Plummer, took as security for a debt, some electric machinery shipped by the Telegraph Supply Company, of Cleveland, Ohio, the predecessor of the Brush Electric Company. This machinery, at the dissolution of the firm of Roe and Plummer, came into the possession of George H. Roe.

The first plant was started in the rear of what is now the Pacific Building, on the corner of Fourth and Market Streets, and it had the distinction of

being the first electric lighting central station established in the world. Electric lights had been used before this time in factories, mills and other places where power was available, but this was the first building erected for the purpose of distributing electric light and this was the first time electric light had been distributed throughout a city. This plant lasted but a short time, as it was destroyed by fire. The company's generating station was then moved to 119 O'Farrell Street, between Powell and Stockton Streets.

The company then acquired a piece of land on Jessie Street between Third and Fourth Streets, adjoining the Grand Opera House. In 1886 the location was added to, and became known as Station "A." The equipment at that time consisted entirely of what was known as the No. 8 Brush arc machine, having a rated capacity of sixty 2,000-cp. lamps. Incandescent lighting was comparatively unknown. A few groups of eight 16-cp. lamps, known as the "Multiple Series System," were installed, and connected directly in the arc circuit and equipped with the Brush-Swan electric carbon lamp, which, at that time, cost \$1 each. The purpose of this system was to enable the consumer to use incandescent lamps on a series arc light, which, in the early days of arc lighting in San Francisco, were run at 9 6/10 amp.

The original price charged for 12 o'clock arc light service, the plant then being shut down at midnight, was \$10 per week per lamp. This, however, was gradually reduced, and in the early part of 1887 the standard schedule was \$3 per week for 9:30-11 o'clock on Saturdays, and no lights Sundays or holidays—\$4 per week for 12 o'clock lights, \$6 per week for all night lights.

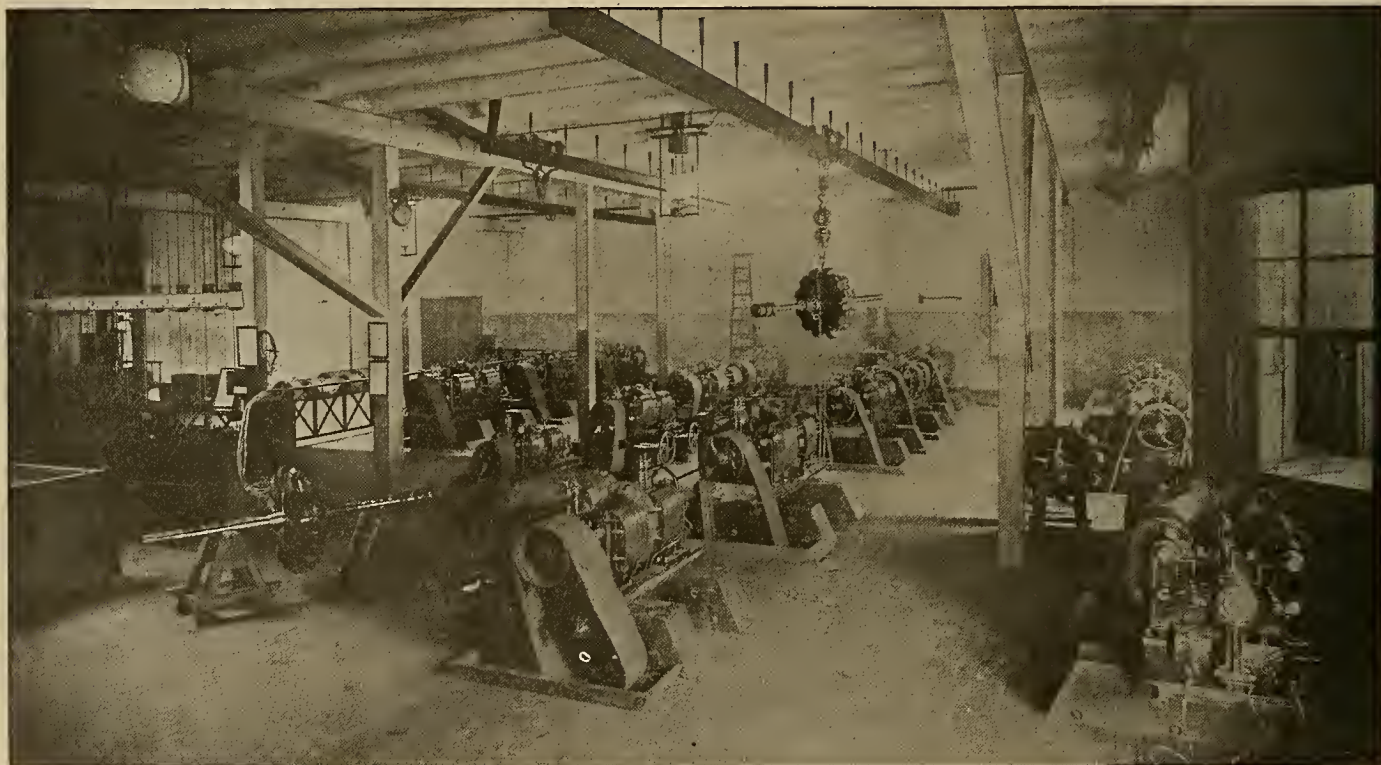
At this time the company was furnishing about 1,500 arc lights, including its private consumers and the city and county of San Francisco, the latter being supplied largely by what was known as the "Mast System." Under this system there were twenty-one masts, 150 ft. high, carrying four 4,000 cp. lamps each, situated, largely, in the outskirts of the city.

Early Commercial Lighting

During 1887 two series of the Brush multiple lamps, aggregating sixteen lamps, were installed in Rosenthal's shoe store on Kearny Street, eight in each window. In the spring of 1888, five series, aggregating forty lamps, of this same type were installed in the Bush Street Theater. This was the first theater in San Francisco to use incandescent lamps, and their novelty was a great drawing card for patrons and curious people interested in the development of the electric light.

In January 1888, owing to the increase in business, the company authorized a bond issue of \$300,000, and with the money built station "B" on Townsend Street and Clarence Place. The original equipment for this station consisted of a 700-hp. tandem compound engine, followed later by a 1000-hp. cross compound engine, and later by another engine of the same type, and a remodelled engine of 600 hp. The electrical equipment consisted approximately of thirty-two No. 8 Brush machines.

Early in 1888, a 300-light Brush 110-volt d. c. machine was purchased, and furnished incandescent lighting for the new office building to the California Electric Light Company and also for three consumers, the Bijou Theater, the Cafe Royal and the People's Bank, all on the south side of Market Street between Third and Fourth Streets.



This plant, dating from 1880, was built in San Francisco by the California Electric Light Company. The picture shows the old type Brush generators, and at the extreme left the early form of switchboard.



The old plant of the Mutual Electric Light Company at Steuart and Folsom Streets (left) and one of the modern substations, Station "K," a part of the San Francisco system of the Pacific Gas & Electric Company (right).

In July, 1888, E. J. Baldwin started an electric plant on Stevenson Street between Fifth and Sixth Streets, and commenced to light the Baldwin Hotel therefrom. This plant consisted of a Westinghouse vertical engine, attached by belt to a Westinghouse a. c. generator.

Introduction of Incandescent Lighting

Owing to the rapid introduction of the incandescent lighting system in other cities, it became necessary to take up this matter seriously, and a 1,000-light Brush alternating machine, 2,000-volt primary, was purchased. This was installed in station "B" and connected to a 100-hp. "Ball" compound engine. In the meanwhile, lines were run, and on a Saturday morning in September, 1890, the machine was started. At this time this machine supplied seven consumers, consisting of a restaurant at 1366 Market Street; Yosemite billiard parlors, St. Ann's Building, the Bank of California; Balfour, Guthrie & Company; the London & Liverpool & Globe Insurance Company, and F. A. Hyde. Light was furnished that night and the machine shut down about noon. The next day, being Sunday, the machine was looked over, and started up again at 3 o'clock. It seems, however, that the governor of the engine was out of order, and as a consequence, about 10 minutes after 3 o'clock the machine blew up, owing to the excessive speed, and was scattered all over the station, one field coil being thrown through the front window and falling within 5 ft. of the gas tank of the Pacific Gas Improvement Company, just across the street. That night, upon the return of Mr. Roe, the manager, from San Jose, a machine to replace it was ordered by telegraph, and Professor Hesse, of the University of California, was taken into council on Monday morning to figure a set of disks to which the field magnets could be attached in order to obviate the possibility of a similar accident. This machine arrived about 60 days later by express and was immediately put into service. Three other machines of similar type were purchased as the business increased.

The California Electric Light Company also held the patent rights of the Brush Electric Company for the states of California, Oregon, Washington and

Nevada. Many plants which are now part of the Pacific Gas & Electric system were originally equipped by this company with the old Brush arc machine. These patent rights became extremely valuable on account of the double carbon arc lamp patent, which was sustained in a number of suits, practically keeping every other arc lamp out of the field. Upon the incorporation of the Edison Light & Power Company, the supply business, in so far as machinery jobbing was concerned, was discontinued.

The first electric public street lighting was done by the California Electric Light Company, commencing July 2, 1883, the first lamp used being a 2,000-cp. arc lamp upon a pole located opposite the New City Hall in Park Avenue. Between this date and March, 1884, thirty-five blocks bounded by Ellis, Pine, Powell and Leavenworth Streets, were lighted, and on March 10, 1884, the company offered to light the whole city with Brush arc lights under the following proposal:

672—2,000-cp. lamps @ \$0.66 each per night.

132—4,000-cp. lamps @ \$1.32 each per night.

The 2,000-cp. lamps were to be placed singly upon 35-ft. poles and the 4,000-cp. lamps to be placed upon thirty-four masts, 150 ft. high, each mast carrying four 4,000-cp. lamps. A contract was finally let to the California Electric Light Company for a term dating from Sept. 1, 1884, to July 31, 1886, for four 150-ft. masts and one 100-ft. mast each equipped with four lamps of 4,000-cp. each at \$5.28 per mast per light night, provided the installation was successful for thirty days. No extension of the district lighted by single arcs was made.

In August, 1886, the plant of the California Electric Light Company generated all current by steam. The company was supplying to private consumers at this time current for 500 lamps of 2,000 nominal candle power at the following prices: all night, \$6 per lamp, per week, 12 o'clock \$4 per lamp, per week. Early in 1889 the Electric Improvement Company started by I. Gutte, A. St. J. Bowie, the Howard Estate, Louis F. Haggin and others, commenced to operate a small plant at the junction of Vallejo, East and Davis Streets. In 1890 this company wired the Palace Hotel for incandescent light-

ing, installing the necessary engines and a Slattery dynamo for generating the current.

The Electric Improvement Company's Palace Hotel station at the corner of New Montgomery and Mission Streets, supplied arc lights only, for a long while, having as many as 800 in use. The prices charged per week were \$4.50 for all night lamps, \$3.50 for 12 o'clock, and \$2.25 for 9:30 o'clock lamps. Not being able to get permission to place poles, except upon Mission Street and the city front, this company strung its wires on house tops on the other streets traversed, notably, Kearny, Market, Pacific

chines, and the usual complement of boilers and auxiliaries.

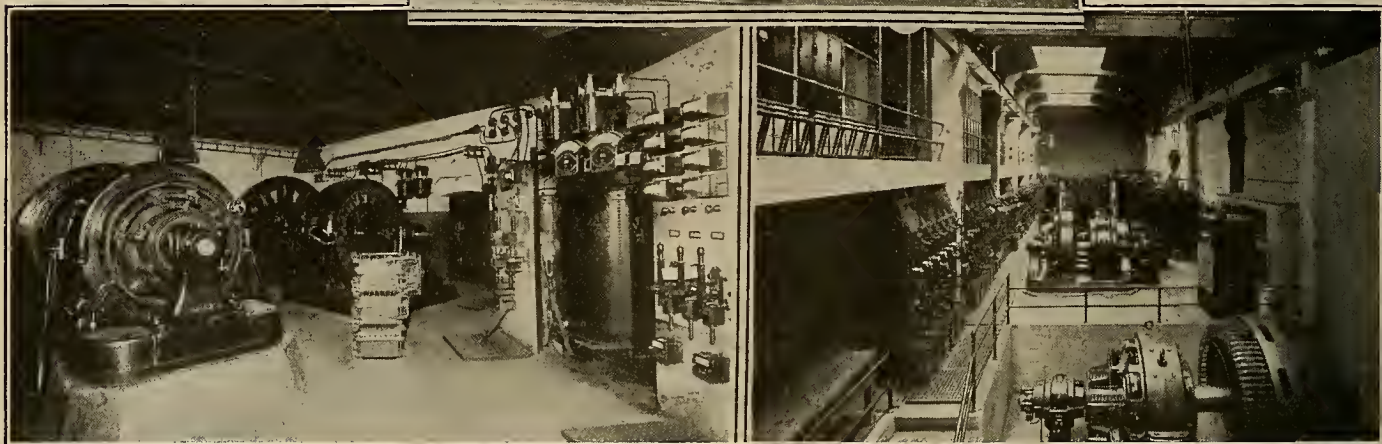
The 100-light Brush alternator, when first placed flew apart and J. Ryan, who was filling an oil cup on it at the time, was knocked unconscious to the other side of the dynamo room by the concussion. Part of the armature was embedded in the wall of the dynamo room some 50 or 60 ft. away.

On July 1, 1891, the Edison Light & Power Company was incorporated with 30,000 shares at \$100 par valuation each. This company was incorporated primarily because of the activity of what was then

(Top) One of the first substations erected by the San Francisco Gas & Electric Company. This station is located on Townsend Street in San Francisco and is now being operated by the Pacific Gas & Electric Company. (Lower left) Station "B" of the San Francisco Gas & Electric Company was one of the early substations constructed to house equipment to distribute current to the electric power users of San Francisco.



(Lower right) Interior of Station "G," Oak and Broderick Streets, one of the modern substations of the Pacific Gas & Electric Company in San Francisco. This company operates many stations similar to this one in which the transmission voltage is reduced for distribution throughout the city.



and Montgomery Streets, and in consequence was always in trouble concerning them.

In December, 1892, or January, 1893, the Electric Improvement Company sold its San Francisco property to the Edison Light & Power Company for 1,330 shares of the stock of that corporation. During the competition with the Electric Improvement Company incandescent rates were practically cut in half, reaching as low as 10 cents per kw-hr.

The Electrical Equipment in 1890

The California Electric Light Company in 1890 had two generating stations, "A" on Jessie Street and "B" at the corner of Townsend and Clarence Streets. Station "A" included steam engines aggregating 1,300 hp., 18 arc light machines aggregating 990 lights of Thompson Houston and Brush manufacture, and three Brush incandescent machines of about 1,000-light aggregate capacity. In addition, there was the usual complement of steam boilers and other auxiliaries. Station "B" included steam engines aggregating 1,850 hp., Brush arc light ma-

known as The Edison General Electric Company which was trying to get a franchise to supply current, making it necessary to come to terms with them or have a bitter fight. Through the efforts of the late Charles R. Lloyd an agreement was reached in New York and a new station was added to the two already in operation and fully equipped with the direct current Edison (three wire) system, which was the system that the Edison General Electric Company would have operated under.

At the time of the consolidation with the Edison interests the old California Electric Light Company ceased operating but was not disincorporated. The new company, the Edison Light and Power Company, was formed with George H. Roe as president and general manager, and F. F. Upton as secretary, taking the place of P. B. Cornwall and Mr. Roe who held respective offices in the California company. The Edison Light & Power Company bought the property of the California Electric Light Company, giving shares of its stock in payment.

The first installation at Station "C" was a J. Morton Poole, triple expansion engine of 300 hp. direct connected to two Edison generators. Shortly after this five more engines of this type of double the capacity were added, completing the installation to the year 1900. This station was destroyed by fire on Feb. 22, 1906. The first three-wire underground service furnished by the Edison Light & Power Company was to the old Tivoli Opera House on Eddy Street, the company having to borrow two small Edison Bipolar machines which were run by the Savage engine in Station "A" until the machinery in Station "C" was ready. These machines were started up about 6 p.m. and closed down at 12 p.m., the load being run on the alternating system during the last half of the night and daytime.

In April, 1893, the Western Light & Power Company was incorporated with 5,000 shares at \$100 par valuation, all issued, Messrs. A. Bouvier, A. St.J. Bowie, and others being the principals and officers. A small plant located in the basement of the General Keyes building on Stockton Street, corner O'Farrell, was run for two or three years with slight profit, if any, owing to violent cutting of rates by the Edison company, which company finally bought enough stock to gain control.

Many Small Plants Started

On Jan. 10, 1894, the Harbor Light & Power Company was incorporated by Jos. Ough, Wm. Brown and C. E. Whitney, and by several commission merchants who thought there was considerable profit awaiting them in this business. There were 100,000 shares of \$10 par value each. The plant consisted of one 150-hp. engine, one 30-light Brush arc machine, one 125-hp. boiler, and was located near the Seawall at the foot of Vallejo Street. The Edison company finally acquired a majority of the stock and stopped operation of the plant.

From this time on numerous small plants or plants installed in large hotels and office buildings having surplus power commenced supplying locally to stores, saloons and smaller office buildings, and cut quite materially into the business of the Edison company and the San Francisco Gas & Electric Company, its successor. Among these may be mentioned the Commercial Power Company, Sacramento Street,

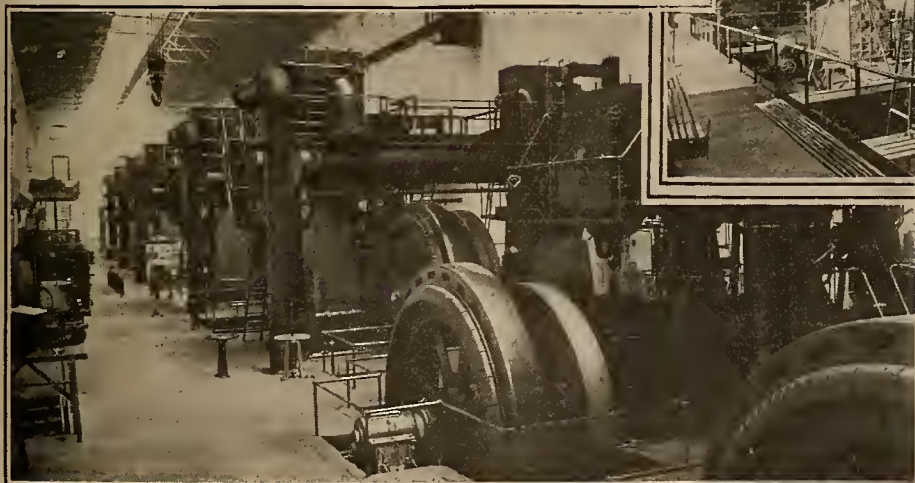
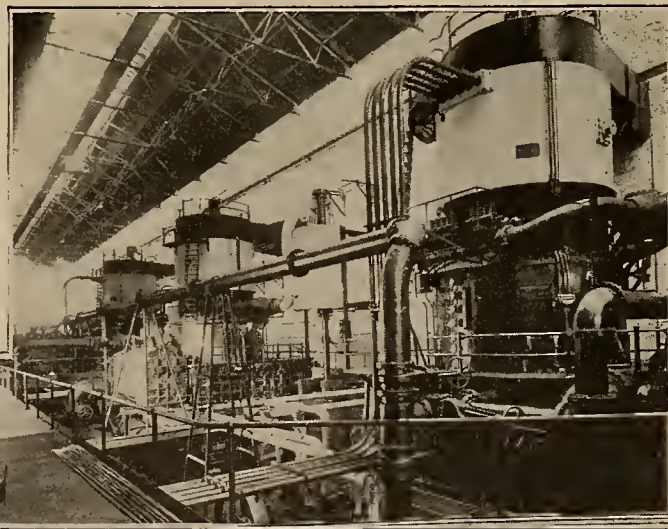
near Battery; California Hotel, Bush Street near Grant Avenue; Mills Building, Montgomery and Bush Streets; Pacific Power Company, Stevenson and First Streets; Martell Power Company, Fremont Street, between Mission and Howard; Central Light & Power Company, Emporium; and the Standard Electric Company's San Francisco plant, Stevenson Street near First Street.

These companies, with the exception of the Mills Building and the Martell Power Company, were subsequently purchased by the San Francisco Gas & Electric Company.

San Francisco Gas & Electric Company Formed

On Dec. 11, 1896, the San Francisco Gas & Electric Company was formed by the merging of the properties of the San Francisco Gas Light Company and the Edison Light & Power Company, operation under the new name commencing Jan. 1, 1897, and 200,000 shares at \$100 par valuation were authorized. The electric plant taken over from the Edison company, which was entirely steam generating and with a capacity of about 360 kw-hr. in alternating current generation, 2,800 kw-hr. in direct current generation, and 3,200-engine hp. in arc lamp capacity supplying 3,325 lamps, was added to in generators, engines and large storage batteries, as growth of the business made necessary, until 1903, when the property of the Independent Electric Light & Power Company was purchased.

The generating plant capacity at the end of 1899 was as follows: Station "C" aggregated 3,300-engine hp., with the usual complement of boilers, and included also 400 kw. in Corliss engine driven Edison generators. Station "A" included 360 kw. in Ball engine driven generators. Station "B" included



(Lower left) Interior of Station "A" of the San Francisco Gas & Electric Company with the installation made in 1900. Triple expansion marine-type engines were used to drive a.c. generators.

(Upper right) Steam turbines have been installed in Station "A" to replace the marine-type engines. The equipment pictured above is typical of that now in use in the steam-electric plants of the West.

3,200 hp. in Corliss engine driven Brush and Wood arc machines.

The Independent Electric Light & Power Company was incorporated March 29, 1899, with an authorized stock issue of 100,000 shares at \$100 par valuation. It commenced operation on Aug. 1, 1900, with about 5,000 engine hp., driving a.c. Westinghouse generators, and included four substations with a complement of transformers. The transmission voltage was 11,000 volts and was carried underground.

During 1900 the San Francisco Gas & Electric Company added to its station "C" plant 1,200-kw. capacity, to its station "B" plant 975 kw. in steam-driven alternating current, and 200 kw. in direct current. In 1901 there was added to the Fern Avenue substation 500-kw. in motor generating sets and the same capacity in Edison storage battery equipment. In 1902, there was added to the Eleventh and Minna Streets substation, 450 kw. in motor generating sets and the equivalent capacity in Edison storage battery equipment. A corresponding addition was made to the Pacific and Stockton Streets substation in 1903. In 1903 there was added to the Independent Light & Power Company equipment 3,000 kw. in McIntosh & Seymour engines driving Westinghouse alternators.

Prior to the fire of 1906, the Mutual Electric Light Company's plant included 3,000 kw. in engine-driven a.c. generating sets, a 375-kw. motor generator, and a small arc transformer. In 1911 the plant included 4,000 kw. in engine-driven alternators, a 374-kw. motor generator, and the necessary boilers and transformers.

San Francisco Equipment During 1912

In 1912 the plant at the Potrero ("A") station of the San Francisco Gas & Electric Company included 45,500 hp. in steam engine and steam turbine generating sets. The substation equipment at "B" included 800 kw. in motor generators, and a 250-kw. rotary converter. At station "C" there was 6,250 kw. in motor generating sets, and 900 kw. in Edison storage battery equipment. At station "D" there was 2,000-kw. capacity in motor generating sets, arc light and other transformers, and 1,000 capacity in Gould storage battery equipment. At station "E" there was 800 kw. in motor generators, arc and other transformers. At station "G" there were 500 light arc transformers, and 3,000 kw. in a.c. transformers. At station "H" there was 11,000 kw. in transformer capacity. At station "I" there was 2,250 kw. in motor generator sets, and 1,000 kw. in Gould storage battery equipment. At station "J" there was 1,400 kw. in motor generator sets.

Electric rates in San Francisco, because of constant competition, have always averaged less than rates elsewhere in the United States; starting at 20 cents per kw-hr. flat for incandescent lighting in 1890, the general and municipally authorized rates have periodically been reduced.

The original schedule in 1879 provided that service should be provided to arc lights from sunset to midnight at a charge of \$10 per lamp per week.

This rate was gradually reduced until in 1908 the charge was \$5 per lamp per week for 24-hour service. Graduations of this rate were in effect for shorter lighting periods. Incandescent lighting rates were at the beginning 20 cents per kw-hr. and have graded off until they are now 3 to 9 cents per kw-hr. Electric power rates from 1893 to 1900 were 20 cents per kw-hr. with a 40 per cent discount if the bill exceeded \$3 per month. Rates are now as low as 2½ cents per kw-hr. for large power users.

Of such were the beginnings of the central station industry. So far as concerns this section of the country the first community to follow the example set by San Francisco was the city across the bay, Oakland. On January 1, 1885, the first electric lighting plant was operated there. It consisted of a 150-hp. Thompson slide valve non-condensing engine, a battery of return tubular boilers and three 25-light arc machines, all housed in a building at Second and Washington Streets. In September, 1888, a Westinghouse alternating machine of 1300-light capacity was installed and a new plant erected on the corner of First and Grove Streets, where now stands the Pacific Gas & Electric Company's steam electric station "C" which, at the present time, has an installed capacity of 44,906 hp.

Station "A," the company's big steam plant at the Potrero in San Francisco, has an installed capacity of 85,791 hp., while the North Beach plant is rated at 36,193 hp. There is, also, a steam electric station on the river bank at Sacramento of 6,702 hp. capacity. So that, at the present time, the steam electric plants owned and operated by "Pacific Service" are of an aggregate capacity of 173,592 hp.

The Pacific Gas & Electric Company has, also, been the pioneer in hydroelectric development. The first hydroelectric power plant of commercial importance in the United States was placed in service by the predecessors of the Pacific Gas & Electric Company in 1895. Its builders not only pioneered the generation of electricity by water power for commercial purposes, but succeeded in transmitting the energy a distance of twenty-two miles to Sacramento at the then record pressure of 11,000 volts. This was the first step in the industrial and commercial development of the West and the nucleus of a hydroelectric generating and distributing system that has today developed into the greatest in the world. Folsom power house is still in operation after nearly thirty years of continuous service, and though relegated to comparative insignificance by the giant plants built in recent years it still continues to pour its flow of energy into the network of transmission lines that extend from one end of the state to the other.

Connected to the "Pacific Service" system today are twenty-eight hydroelectric plants, four steam plants and over two hundred substations, all linked together by thousands of miles of transmission and distribution lines. From a small beginning this company has grown until today its activities extend through thirty-six counties of north-central California, serving nearly two million people with light, heat and power.

Thirty-Four Years of Hydroelectric Development in the West

By Norman S. Gallison

COMMERCIAL generation of electricity by water power was inaugurated in the West in 1889 with the installation of the Oregon City plant of the Willamette Falls Electric Company. During the next ten years thirty-six plants were established. These plants were small compared with modern plants. They confined their activities almost entirely to lighting, with some few mining installations. Coal and oil were the basis of power for manufacturing purposes and it was not until the beginning of the present century that electricity was used to any great extent for manufacturing purposes. The phenomenal growth of the industry from this time has paralleled the growth of the West.

Every expansion in industry and agriculture has been reflected in the growth of the electrical industry. The increased use of electricity has become a geometrical rather than an arithmetical relationship to the growth of population. The history of the development of hydroelectric power in the West furnishes

A Chronological record of the major hydroelectric installations in the eleven western states indicates the rapidity of growth of the basic industry of the West.



The San Antonio plant of the San Antonio Power Company, at Pomona, California, built in 1891, was the source of power for the first long distance transmission line — 28 miles at 10,000 volts.

some of the most romantic pages of its colorful history. It is replete with examples of initiative, ingenuity and daring which have been the marvel of the engineering world. World's records have been established and then surpassed, with regularity; apparently insurmountable obstacles have been successfully overcome, so that today the West leads the world in almost every feature of hydroelectric development.

Thirty-five thousand employees are engaged in furnishing electric service in these eleven western states, and the annual payroll of the power companies approaches five millions of dollars. Two million horsepower of installed capacity in hydroelectric plants alone is at the service of one and one-half million consumers. It is estimated that nine billion kilowatt-hours of electrical energy was generated during 1922, and that a billion dollars represents the capital invested in electric systems. Following is a chronological record of the major hydroelectric installations since the inception of the industry in 1889.

| Year. | Name of Original Company. | Location of Power House. | Capacity Kw. | Year. | Name of Original Company. | Location of Power House. | Capacity Kw. |
|-------|-------------------------------|--------------------------|--------------|-------|-------------------------------|--------------------------|--------------|
| 1889 | Willamette Falls Electric Co. | Oregon City, Ore. | 720 | 1898 | Santa Ana Canyon Power Co. | Santa Ana, Cal. | 3,000 |
| 1890 | Telluride Power Co. | Ames, Colorado | 300 | 1898 | Missouri River Power Co. | Canyon Ferry, Mont. | 3,000 |
| 1891 | San Antonio L. & P. Co. | Pomona, Cal. | 120 | 1898 | Tuolumne Water Co. | Phoenix Lake, Cal. | 1,125 |
| 1892 | Walla Walla G. & E. Co. | Walla Walla, Wash. | 100 | 1898 | Mt. Whitney Power Co. | Kaweah No. 1, Cal. | 1,350 |
| 1893 | Redlands Elec. L. & P. Co. | Mill Creek 1, Cal. | 750 | 1899 | Montana Water & E. Co. | Bi-Metallic, Mont. | 1,350 |
| 1894 | Standard Con. Min. Co. | Bodie, Cal. | 120 | 1899 | Redlands Elec. L. & P. Co. | Mill Creek 2, Cal. | 250 |
| 1894 | Silver Lake Power Co. | Silver City, Idaho | 500 | 1899 | Big Creek Power Co. | Big Creek, Cal. | 300 |
| 1895 | Utica Power Co. | Murphy's, Cal. | 75 | 1899 | Yuba Electric Power Co. | Colgate, Cal. | 3,420 |
| 1895 | Folsom Water Power Co. | Folsom, Cal. | 3,000 | 1899 | Snoqualmie Falls Power Co. | Snoqualmie Falls, Ws. | 7,000 |
| 1895 | Portland G. E. Co. | Oregon City, Ore. | 5,730 | 1899 | Truckee R. G. E. Co. | Farad, Cal. | 1,500 |
| 1895 | Consumers L. & P. Co. | Spokane, Wash. | 300 | 1900 | Butte Co. E. P. & L. Co. | Centerville, Cal. | 800 |
| 1895 | Big Cottonwood P. Co. | Ogden Creek, Utah | 1,800 | 1900 | Walla Walla G. & E. Co. | Walla Walla, Wash. | 300 |
| 1895 | Manitou Tunnel P. Co. | Manitou, Colo. | 350 | 1900 | Yreka Light & Power Co. | Yreka, Cal. | 150 |
| 1896 | Tuolumne Water Co. | Knights Ferry, Cal. | 1,500 | 1900 | Big Fork Power & Light Co. | Big Fork, Mont. | 450 |
| 1896 | Nevada Co. E. P. Co. | Rome, Cal. | 300 | 1900 | Butte Lighting & Power Co. | Divide, Mont. | 3,000 |
| 1896 | Utica Power Co. | Murphys, Cal. | 1,500 | 1900 | Swan Falls Power Co. | Swan Falls, Idaho | 900 |
| 1896 | Power Development Co. | Kern River, Cal. | 1,350 | 1901 | Standard Electric Co. | Electra, Cal. | 10,000 |
| 1896 | San Joaquin L. & P. Co. | San Joaquin No. 1, Cal. | 1,050 | 1901 | Valley Counties Power Co. | Centerville, Cal. | 900 |
| 1896 | Big Creek Power Co. | Big Creek, Cal. | 990 | 1901 | Truckee, River G. E. Co. | Reno, Nev. | 700 |
| 1896 | Central Cal. Elec. Co. | Newcastle, Cal. | 800 | 1901 | Sierra Power Co. | Ontario, Cal. | 665 |
| 1896 | Blue Lakes Water Co. | Blue Lakes, Cal. | 1,350 | 1901 | The Dalles E. L. & P. Co. | Tygh Valley, Ore. | 1,000 |
| 1897 | Nevada County E. P. Co. | Rome, Cal. | 300 | 1901 | Telluride Power Co. | Provo, Utah | 1,500 |
| 1897 | Big Cottonwood Power Co. | Ogden, Utah | 3,750 | 1901 | Yuba Electric Power Co. | Colgate, Cal. | 6,000 |
| 1898 | Telluride Power Co. | Provo, Utah | 1,500 | 1901 | Missouri River Power Co. | Canyon Ferry, Mont. | 4,500 |
| 1898 | Central Cal. Elec. Co. | Auburn, Cal. | 500 | 1901 | Pikes Peak Power Co. | Beaver Creek, Colo. | 1,600 |
| 1898 | Yuba Power Co. | Brown Valley, Cal. | 990 | 1901 | Keswick Power Co. | Volta, Cal. | 2,250 |
| 1898 | San Gabriel Elec. Co. | Azusa, Cal. | 1,500 | 1902 | Central Cal. Elec. Co. | Alta, Cal. | 3,000 |
| | | | | 1902 | Ontario Power Co. | Upland, Cal. | 750 |
| | | | | 1902 | Spokane Traction Co. | Spokane, Wash. | 1,920 |
| | | | | 1902 | Madison River Power Co. | Gallatin, Mont. | 2,000 |
| | | | | 1902 | Boise-Payette River E. P. Co. | Horseshoe Bend, Ida. | 1,500 |
| | | | | 1902 | Keswick Power Co. | Volta, Cal. | 750 |

| Year. | Name of Original Company. | Location of Power House. | Capacity Kw. | Year. | Name of Original Company. | Location of Power House. | Capacity Kw. |
|-------|------------------------------------|--------------------------|--------------|-------|--------------------------------|---------------------------|--------------|
| 1903 | Redlands Elec. L. & P. Co. | Mill Creek 3, Cal. | 3,000 | 1912 | Portland Ry., L. & P. Co. | Eestacada, Ore. | 11,000 |
| 1903 | Utah Light & Power Co. | Colliuston, Utah | 1,500 | 1912 | Sierra Pacific Electric Co. | Verdi, Nev. | 3,000 |
| 1903 | Valley Counties Power Co. | De Sabla, Cal. | 4,000 | 1912 | Whateom Co. Ry. & L. Co. | Nooksack Falls, Wa. | 1,500 |
| 1903 | No. California Power Co. | Whitmore, Cal. | 1,500 | 1912 | Pacific Power & Light Co. | Naches, Ore. | 5,750 |
| 1903 | Siskiyou Electric Power Co. | Lairds, Cal. | 1,950 | | | | |
| 1903 | Spokane Traction Co. | Spokane, Wash. | 4,580 | | | | |
| 1903 | California Oregon Power Co. | Fall Creek, Ore. | 2,750 | 1913 | Mt. Whitney Power & E. Co. | Kaweah No. 3, Cal. | 3,500 |
| 1904 | Snoqualmie Falls Power Co. | Snoqualmie Falls, Wn. | 10,000 | 1913 | Seattle Municipal Plant | Lake Union Auxil. | 1,500 |
| 1904 | Puget Sound Power Co. | Electron, Wash. | 22,000 | 1913 | California-Oregon Power Co. | Klamath River, Cal. | 10,000 |
| 1904 | American River Power Co. | Placerville, Cal. | 3,000 | 1913 | So. Sierras Power Co. | Bishop No. 3 & 6, Cal. | 8,750 |
| 1904 | Telluride Power Co. | Logan, Utah | 2,400 | 1913 | Tacoma Municipal Plant | Niequally River, Wa. | 10,000 |
| 1904 | Meotooe Power Co. | Meotooe, Cal. | 1,500 | 1913 | Bend Water, Light & Power Co. | Bend, Ore. | 750 |
| 1904 | Pacific Light & Power Co. | Borel, Cal. | 10,000 | 1913 | Eugecoe Municipal Plant | McKenzie River, Ore. | 2,000 |
| 1904 | Yreka Light & Power Co. | Sisson, Cal. | 360 | 1913 | Pacific Gas & Electric Co. | Drum, Cal. | 25,000 |
| 1904 | Seattle Municipal E. L. & P. Plant | Cedar River, Wash. | 3,000 | 1913 | Northwestern Electric Co. | White Salmon River, Ore. | 12,000 |
| 1904 | Rock Creek Power & T. Co. | Haines, Ore. | 300 | 1913 | Pacific Light & Power Corp. | Big Creek No. 1 & 2 | 70,000 |
| 1904 | Valley Counties Power Co. | De Sabla, Cal. | 4,000 | 1913 | Montana Power Co. | Black Eagle Falls, Mont. | 3,000 |
| 1904 | Siskiyou Electric Power Co. | Klamath Falls, Ore. | 840 | | | | |
| 1904 | No. California Power Co. | Whitmore, Cal. | 1,500 | 1914 | Montana Power Co. | Hauser Lake, Mont. | 3,000 |
| 1905 | Trinity River Electric Co. | Junction City, Cal. | 1,500 | 1914 | Utah Power & Light Co. | Grace, Idaho. | 22,000 |
| 1905 | Mariposa Commercial & M. Co. | Bachy, Cal. | 400 | 1914 | Lewis & Clarkston Dev. Co. | Austin Creek | 750 |
| 1905 | Truckee River Gen. Elect. Co. | Fleish, Cal. | 1,500 | 1914 | Lewis & Clarkston Dev. Co. | Pomeroy, Idaho. | 400 |
| 1905 | Truckee River Gen. Elect. Co. | Washoe, Nev. | 1,500 | 1914 | Great Western Power Co. | Las Plumas, Cal. | 12,500 |
| 1905 | Telluride Power Co. | Grace, Idaho. | 16,000 | 1914 | San Joaquin L. & P. Corp. | Tule River, Cal. | 6,000 |
| 1905 | San Joaquin L. & P. Co. | San Joaquin 3, Cal. | 3,000 | 1915 | Granite Power Co. | Maxville, Mont. | 750 |
| 1905 | Pacific Light & Power Co. | Highgrove, Cal. | 150 | 1915 | Keno Power Co. | Keno, Ore. | 950 |
| 1905 | Edison Electric Co. | Lytle Creek, Cal. | 500 | 1915 | Washington Water Power Co. | Long Lake, Wash. | 34,000 |
| 1905 | Missouri River Power Co. | Canyon Ferry, Mont. | 7,500 | 1915 | Ellensburg Municipal. | Yakima River, Wash. | 550 |
| 1905 | Pacific Gas & Electric Co. | Electra, Cal. | 10,000 | 1915 | Western States Gas & E. Co. | American River, Cal. | 1,875 |
| 1905 | Mt. Whitney Power Co. | Kaweah No. 2, Cal. | 1,500 | 1915 | Escodido Mutual Water Co. | Bear Valley, Riocon, Cal. | 600 |
| 1905 | Everett Ry., L. & W. Co. | Everett, Wash. | 10,000 | 1915 | Arizona Power Co. | Fossil Creek, Ariz. | 1,600 |
| 1905 | No. Mountain Power Co. | Canyon Creek, Cal. | 2,000 | 1915 | Buffalo Mfg. Co. | Buffalo, Wyo. | 375 |
| 1905 | Nevada Power & Milling Co. | Bishop, Cal. | 1,500 | 1915 | Utah Power & Light Co. | St. Anthony, Idaho. | 500 |
| 1905 | Pikes Peak Hydroelectric Co. | Manitou, Colo. | 2,250 | 1915 | Utah Power & Light Co. | Oncida, Idaho. | 10,000 |
| 1905 | Oroville Light & Power Co. | Lime Saddle, Cal. | 2,000 | 1915 | Main Range Power Co. | Polson, Mont. | 500 |
| 1905 | Valley Counties Power Co. | De Sabla, Cal. | 5,000 | | | | |
| 1905 | Snoqualmie Falls Power Co. | Snoqualmie Falls, Wn. | 5,000 | 1916 | Great Western Power Co. | Las Plumas, Cal. | 12,500 |
| 1906 | Holton Power Co. | Holtville, Cal. | 250 | 1916 | Pacific Gas & Electric Co. | Halsey, Cal. | 12,500 |
| 1906 | Santa Ana Canyon Power Co. | Santa Ana No. 2, Cal. | 1,000 | 1916 | San Joaquin L. & P. Corp. | Merced Falls, Cal. | 450 |
| 1906 | Edison Electric Co. | Kero No. 1, Cal. | 22,000 | 1916 | Utah Power & Light Co. | Oncida, Idaho. | 10,000 |
| 1906 | Washington Water Power Co. | Post Falls, Idaho. | 9,000 | 1916 | Montana Power Co. | Thompson Falls, Mont. | 30,000 |
| 1906 | Nevada Power & Milling Co. | Bishop, Cal. | 4,500 | 1916 | Montana Power Co. | Great Falls, Mont. | 60,000 |
| 1906 | Animas Power & Water Co. | Silverton, Colo. | 1,500 | | | | |
| 1906 | Oroville Light & Power Co. | Coal Canyon, Cal. | 1,000 | 1917 | Pacific Gas & Electric Co. | Wise, Cal. | 12,500 |
| 1906 | LaGrange Water & Power Co. | La Grange, Cal. | 450 | 1917 | Snow Mt. W. & P. Co. | Potter Valley, Cal. | 2,000 |
| 1907 | Northern California Power Co. | Volta, Cal. | 2,000 | 1917 | Pacific Gas & Electric Co. | Spaulding, Cal. | 3,750 |
| 1907 | Oregon Water Power & Ry. Co. | Cazadero, Ore. | 7,500 | 1917 | City of Los Angeles | San Francisco No. 1, Cal. | 28,125 |
| 1907 | Pacific Gas & Electric Co. | Colgate, Cal. | 5,500 | 1917 | San Joaquin L. & P. Corp. | San Joaquin No. 2, Cal. | 3,000 |
| 1907 | Washington Water Power Co. | Post Falls, Idaho. | 2,250 | 1917 | Nevada-California Power Co. | Rush Creek, Cal. | 5,000 |
| 1907 | Nevada-California Power Co. | Bishop, Cal. | 1,500 | 1917 | Southern California Edison Co. | Footana, Cal. | 2,400 |
| 1907 | Olympia Light & Power Co. | Tumwater, Wash. | 1,000 | 1917 | City of Los Angeles | River Power, Cal. | 3,600 |
| 1907 | Spokane & Inland E. R. R. Co. | Rosalia, Wash. | 7,500 | 1917 | Utah Power & Lt. Co. | Cove, Idaho. | 7,500 |
| 1907 | San Joaquin Light & Power Co. | San Joaquin No. 1 | 3,000 | 1917 | Telluride Power Co. | Paquitch, Utah | 50 |
| 1907 | Shasta Power Co. | Soow Creek, Cal. | 1,200 | 1917 | Montana Power Co. | Rainbow, Mont. | 10,000 |
| 1908 | Tuolumne Electric Co. | Groveland, Cal. | 1,200 | 1917 | Dixie Power Co. | St. George, Utah | 750 |
| 1908 | Telluride Power Co. | Jordan Narrows, Utah | 2,400 | 1917 | Montana Power Co. | Holter, Mont. | 40,000 |
| 1908 | Pacific Light & Power Co. | Arlington, Cal. | 600 | 1918 | California Oregon Power Co. | Copco, Cal. | 12,500 |
| 1908 | Pacific Gas & Electric Co. | Centerville, Cal. | 5,500 | 1918 | Chelan Falls Power Co. | Chelan River, Wash. | 750 |
| 1908 | No. California P. Co., Con. | Volta, Cal. | 2,400 | 1918 | City of San Francisco | Cherry Creek, Cal. | 3,000 |
| 1908 | Northern E. L. & P. Co. | So. Cow Creek, Cal. | 1,500 | 1918 | Telluride Power Co. | Beaver, Utah | 2,000 |
| 1908 | Madison River P. Co. | Gallatin, Mont. | 9,600 | 1918 | Idaho Power Co. | Swan Falls, Idaho. | 5,700 |
| 1908 | Great Western Power Co. | Las Plumas, Cal. | 40,000 | 1918 | Salt River Valley, W. U. A. | Mesa, Ariz. | 600 |
| 1908 | Whateom Co. Ry. & L. Co. | Nooksack Falls, Wa. | 500 | 1918 | Department of Interior | Yosemite, Cal. | 2,000 |
| 1908 | Pacific Gas & Electric Co. | Deer Creek, Cal. | 5,500 | 1919 | San Joaquin L. & P. Corp. | Crane Valley, Cal. | 1,000 |
| 1908 | Arizona Power Co. | Fossil Creek, Ariz. | 5,400 | 1919 | Washington Water Power Co. | Long Lake, Wash. | 17,000 |
| 1908 | Snow Mountain W. & P. Co. | Potter Valley, Cal. | 4,000 | 1919 | San Joaquin L. & P. Corp. | Plant No. 1A, Cal. | 425 |
| 1908 | Nevada-California Power Co. | Bishop Creek, Cal. | 1,500 | 1919 | Puget Sound Pow. & Lt. Co. | White River, Wash. | 20,000 |
| 1909 | Stanislaus Electric Power Co. | Relief Creek, Cal. | 34,000 | 1919 | Nevada-California Power Co. | Bishop Creek No. 5, Cal. | 1,850 |
| 1909 | Portland Ry., L. & P. Co. | Cazadero, Ore. | 3,000 | 1919 | Ontario Power Co. | Ontario No. 2, Cal. | 500 |
| 1909 | Telluride Power Co. | Battle Creek, Utah | 5,000 | 1919 | Idaho Power Co. | Lower Salmon Falls, Idaho | 2,500 |
| 1909 | Mt. Whitney Power Co. | Tule River, Cal. | 2,000 | 1920 | Utah Power & Light Co. | Oncida, Idaho | 10,000 |
| 1909 | Seattle Municipal E. L. & P. P. | Cedar River, Wash. | 8,000 | 1920 | Okanogan Valley Power Co. | Oroville, Wash. | 2,000 |
| 1909 | Nevada-California Power Co. | Bishop, Cal. | 1,500 | 1920 | Pacific Gas & E. Co. | Spaulding No. 2, Cal. | 1,000 |
| 1909 | Snow Mt. Water & Power Co. | Potter Valley, Cal. | 2,000 | 1920 | San Joaquin L. & P. Corp. | Kerckhoff, Cal. | 42,600 |
| 1909 | Great Northern Railway Co. | Tumwater, Wash. | 9,000 | 1920 | City of Los Angeles | Hailey, Cal. | 1,050 |
| 1910 | Portland Ry., L. & P. Co. | Cazadero, Ore. | 3,750 | 1920 | Idaho Power Co. | Thousand Springs, Idaho | 6,000 |
| 1910 | Telluride Power Co. | Olmstead, Utah | 9,000 | 1920 | Sinka Hydro Power Co. | Lander, Wyo. | 260 |
| 1910 | Northern California P. Co., Cons. | Ioskip, Cal. | 6,000 | 1920 | U. S. Reclamation Service | Ft. Laramie Canal, Wyo. | 900 |
| 1910 | Idaho-Oregon L. & P. Co. | Ox Bow Bend, Idaho | 7,200 | 1921 | Pacific Gas & E. Co. | Spring Gap, Cal. | 7,850 |
| 1910 | Holton Power Co. | Holtville, Cal. | 700 | 1921 | Big Springs Electric Co. | Moroni, Utah | 400 |
| 1910 | La Grange, Water & Power Co. | La Grange, Cal. | 450 | 1921 | So. Cal. Edison Co. | Big Creek No. 2, Cal. | 17,500 |
| 1910 | Nevada-California Power Co. | Bishop, Cal. | 2,500 | 1921 | Brigham City Municipal. | Brigham City, Utah | 1,200 |
| 1910 | Washington Water Power Co. | Little Falls, Wash. | 5,000 | 1921 | So. Cal. Edison Co. | Kern River No. 3, Cal. | 35,000 |
| 1910 | No. California Power Co., Con. | So. P. H., Cal. | 4,000 | 1921 | Dixie Power Co. | St. George, Utah | 750 |
| 1910 | Montana Power Co. | Rainbow, Mont. | 25,000 | 1921 | City of Los Angeles | Franklin Canyon | 2,500 |
| 1911 | Montana Power Co. | Hauser Lake, Mont. | 15,000 | 1921 | Utah Power & Light Co. | Vernal, Utah | 600 |
| 1911 | Great Western Power Co. | Butt Creek, Cal. | 800 | 1921 | So. Cal. Edison Co. | Big Creek No. 8, Cal. | 25,000 |
| 1911 | No. California Power Co. | Coleman, Cal. | 15,000 | 1921 | Great Western Power Co. | Caribou, Cal. | 45,000 |
| 1911 | Idaho-Oregon L. & P. Co. | Oxbow, Idaho | 14,400 | 1921 | Pacific Gas & E. Co. | Hat Creek No. 1, Cal. | 12,500 |
| 1911 | Washington Water Power Co. | Little Falls, Wash. | 5,000 | 1921 | Pacific Gas & E. Co. | Hat Creek No. 2, Cal. | 12,500 |
| 1911 | Seattle-Tacoma Power Co. | White River, Wash. | 20,000 | 1921 | So. Sierras Power Co. | Adams Aux., Cal. | 3,000 |
| 1911 | Nevada-California Power Co. | Bishop, Cal. | 3,500 | 1921 | San Joaquin L. & P. Corp. | Kero Canyon, Cal. | 9,000 |
| 1911 | Roosevelt Dam Power Co. | Roosevelt, Ariz. | 3,600 | 1921 | Utah Power & Light Co. | Olmstead, Utah | 5,500 |
| 1911 | Central Colorado Power Co. | Shoshone, Colo. | 10,000 | 1921 | Idaho Power Co. | Shoshone Falls, Idaho | 10,000 |
| 1911 | Central Colorado Power Co. | Boulder Creek, Colo. | 10,000 | 1921 | Northwestern Power & Mfg. Co. | Port Angeles, Wash. | 3,000 |
| 1911 | California Oregon Power Co. | Prospect, Cal. | 4,700 | 1922 | Pacific Gas & Electric Co. | Pit No. 1, Cal. | 70,000 |
| 1911 | Portland Ry., L. & P. Co. | River Mill, Ore. | 11,000 | 1922 | Northwestern Pow. & Mfg. Co. | Port Angeles, Wash. | 3,000 |
| 1911 | San Joaquin L. & P. Corp. | San Joaquin 1, Cal. | 9,000 | 1922 | Pacific Gas & Electric Co. | Drum, Cal. | 12,500 |
| 1911 | San Joaquin L. & P. Corp. | Kero River, Cal. | 3,000 | 1922 | Seattle Municipal. | Cedar Falls, Wash. | 15,000 |
| | | | | 1922 | California Oregon Power Co. | Copco, Cal. | 12,500 |
| | | | | 1922 | City of Los Angeles | San Fernando, Cal. | 7,000 |
| | | | | 1922 | City of Los Angeles | San Francisco No. 1, Cal. | 12,000 |
| | | | | 1922 | Washington Water Power Co. | U. Spokane Falls, Wash. | 10,000 |
| | | | | 1922 | U. S. Reclamation Service | Shoshone Dam, Wyo. | 2,000 |

A Thirty-Seven Million Dollar Market in the West

ESTIMATES of the number of new homes to be built in the West during 1923 place this figure in the neighborhood of 144,000. This is based upon figures of actual construction for 1922, which for California alone amounted to 87,000 building permits. That this figure is not exorbitant and indeed, that it does not represent the full number of new customers to be anticipated in the field for electric wiring and appliances is indicated by the record of new customers reported by the power companies, which for 1922 was 102,000 for California and 131,700 for the West as a whole.

In order to estimate what this building activity might mean for the electrical industry in sales of wiring material and current consuming devices during the coming year, figures were secured from various sources on the sale of electric appliances during 1922. Applying a correction average, to include the channels for which figures were not available, it was estimated that \$32,874,456 was spent in the eleven western states during the past year to take care of the household needs alone. This was divided as shown in the accompanying table showing expenditures for home equipment.

EXPENDITURES FOR HOME EQUIPMENT

1922 — 11 Western States

| | |
|------------------|--------------|
| Wiring | \$11,856,800 |
| Appliances | 21,017,656 |
| Total | \$32,874,456 |

This is probably somewhat under the actual figures, but checks very well with the increase in current consumption from household sources during the past year, as this is translated into terms of the increased use of appliances.

There are always those who question the predictions of increased markets on the ground that the saturation point has been reached. This is hardly a factor to be considered in the case of so new an industry as the electrical field, but in any case, it is well to remember that the market for electrical appliances is a constantly expanding one, as represented by the yearly increase in the number of consumers on the books of the power companies. This market for the West is now nearly double what it was in 1916—and shows no tendency toward a lessened growth.

RESIDENCE, COMMERCIAL AND POWER CONSUMERS 11 Western States

| | Residence | Commercial | Power |
|-------------|-----------|------------|--------|
| 1916 | 854,200 | 174,300 | 43,050 |
| 1917 | 940,900 | 188,700 | 46,870 |
| 1918 | 1,040,300 | 203,300 | 53,030 |
| 1919 | 1,084,800 | 213,700 | 56,820 |
| 1920 | 1,172,000 | 229,800 | 65,290 |
| 1921 | 1,280,900 | 259,800 | 72,000 |
| 1922 | 1,414,200 | 289,800 | 79,000 |
| 1923* | 1,575,000 | 320,000 | 86,500 |

*Estimated.

There are 1,414,200 wired homes in the eleven western states. This represents 83% of the homes in the district served by the power companies, 74% of all homes in the West.

In order to ascertain how many appliances are now in use in these wired homes, as well as to afford an indication of the present absorbing power of the average home connected to the power company lines from the standpoint of electrical equipment, the Journal of Electricity and Western Industry sent out a questionnaire to 500 homes in the West asking for a list of the appliances owned, the average monthly electric bill, the number of

rooms in the home and the number of convenience outlets. From these records, an estimate was obtained of the number of appliances and their nature, per 1,000 homes, the number of convenience outlets per home, and the average kilowatt-hour consumption. An effort had been made to make the homes selected represent as fair a cross-section as possible of all classes, but it was found on completing the tabulation, that the kilowatt-hour consumption was somewhat higher in the homes from which returns were received than prevails on the average. Applying this correction factor, and checking the results with the record of sales of appliances available within the past few years, it was found that the total value of appliances in western homes was approximately \$211,990,400.

The returns indicate an average of \$150 in current consuming devices for every wired home in western territory. It is apparent that this figure alone applied to the estimate of 144,000 new homes predicted for 1923 gives a market prediction of \$21,600,000 in appliances, a figure which checks very well with that already given for 1922, but which yet does not take into account the purchases which will

| SIGNIFICANT FIGURES ON WESTERN MARKETS | |
|--|---------------|
| Homes wired for electricity in the West | 1,414,200. |
| Stores and other commercial establishments wired for electricity in the West | 289,800. |
| Power consumers in the West | 79,000. |
| Convenience outlets in average wired home in the West | 3.3 |
| Value of appliances in use in average wired home in the West | \$150 |
| Sale of appliances and wiring equipment during 1922 in the West | \$32,874,456. |
| Estimated market for appliances and wiring supplies for 1923 in the West | \$39,100,000. |
| Average monthly bill per domestic consumer | \$3.36 |
| Or cost per day for use of lights and appliances | .11 |

be made by old consumers, nor the new consumers who will be developed through the wiring of old residences.

APPLIANCES IN USE AT THE END OF 1922 11 Western States (estimated)

| | Number | Value |
|------------------------------------|-----------|--------------|
| Washing machines | 409,500 | \$57,330,000 |
| Irons | 1,484,600 | 8,165,300 |
| Ironing machines | 65,000 | 4,875,000 |
| Ranges | 87,100 | 15,242,500 |
| Water heaters | 75,000 | 5,625,000 |
| Cookers | 32,500 | 1,300,000 |
| Dish washers | 20,800 | 1,560,000 |
| Disk stoves | 107,900 | 539,500 |
| Grills | 195,000 | 1,950,000 |
| Toasters | 535,900 | 3,483,350 |
| Percolators | 305,800 | 4,587,000 |
| Waffle irons | 292,500 | 4,095,000 |
| Chafing dishes | 75,400 | 1,131,000 |
| Samovars | 32,500 | 325,000 |
| Mixing machines | 32,500 | 390,000 |
| Milk warmers | 42,900 | 214,500 |
| Air heaters | 390,000 | 4,680,000 |
| Vacuum cleaners | 910,000 | 45,500,000 |
| Fans | 372,900 | 5,593,500 |
| Utility motors | 87,100 | 871,000 |
| Soldering irons | 42,900 | 343,200 |
| Curling irons | 227,900 | 1,189,500 |
| Sewing machines | 307,800 | 18,468,000 |
| Warming pads | 248,300 | 1,986,400 |
| Vibrators | 140,000 | 1,123,200 |
| Violet ray | 20,800 | 312,000 |
| Immersion heaters | 20,800 | 104,000 |
| Hair dryers | 65,000 | 975,000 |
| Toys | 87,100 | 2,613,000 |
| Radio | 162,500 | 12,187,500 |
| Christmas tree lighting sets | 763,500 | 4,581,000 |
| Other electric appliances | 30,000 | 750,000 |

\$211,990,400

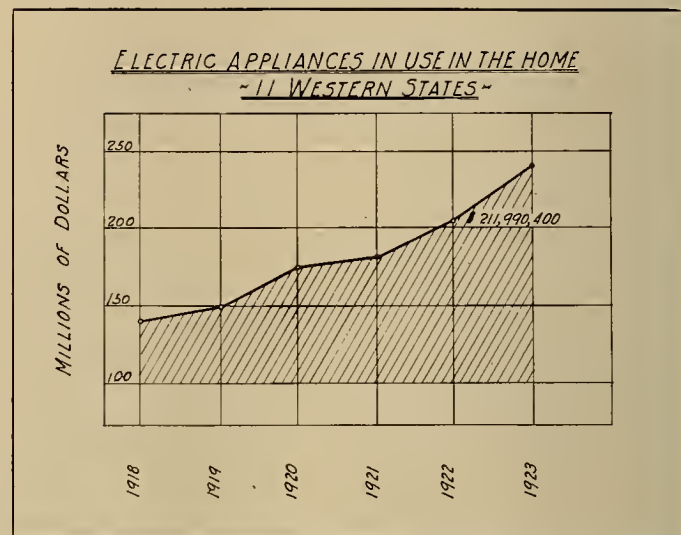
Records of the California Electrical Cooperative Campaign for over 900 homes indicate that the average number of convenience outlets now being installed in California homes is 6.3. The average for the homes replying to the questionnaire was 4, for all wired homes in the West 3.3. A conservative estimate places the increase in outlets in homes now being erected throughout the West over those erected a year ago at 1.5 outlets. Allowing for the increased investment in appliances, which has been shown to bear a definite relationship to the number of outlets

in the home, a figure for probable expenditures during 1923 was arrived at. This was checked with the estimated increase in kilowatt-hour consumption in the household field as reported by the power companies of the West, with the following results:

ESTIMATED MARKET FOR ELECTRICAL APPLIANCES IN THE HOME — 1923 — ELEVEN WESTERN STATES

| | |
|------------------|--------------------|
| Wiring | \$12,900,000 |
| Appliances | 26,200,000 |
| | <hr/> \$39,100,000 |

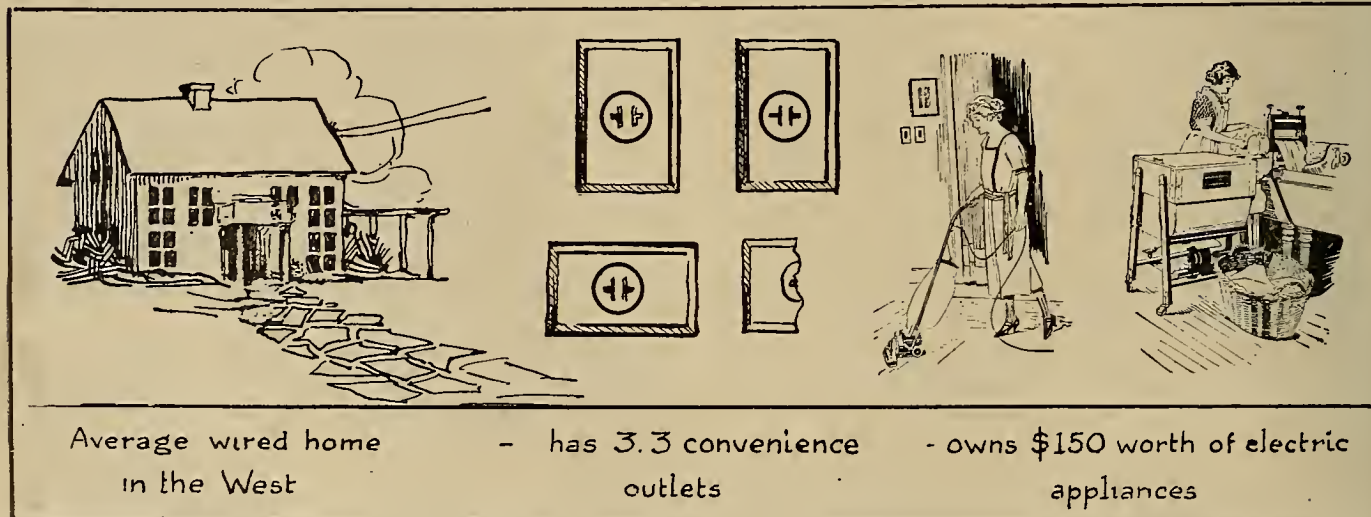
Translated into terms of equipment, this means that approximately 691,000 convenience outlets, 1,934,000 lighting outlets and 1,105,600 switch outlets will be installed in this territory in the coming



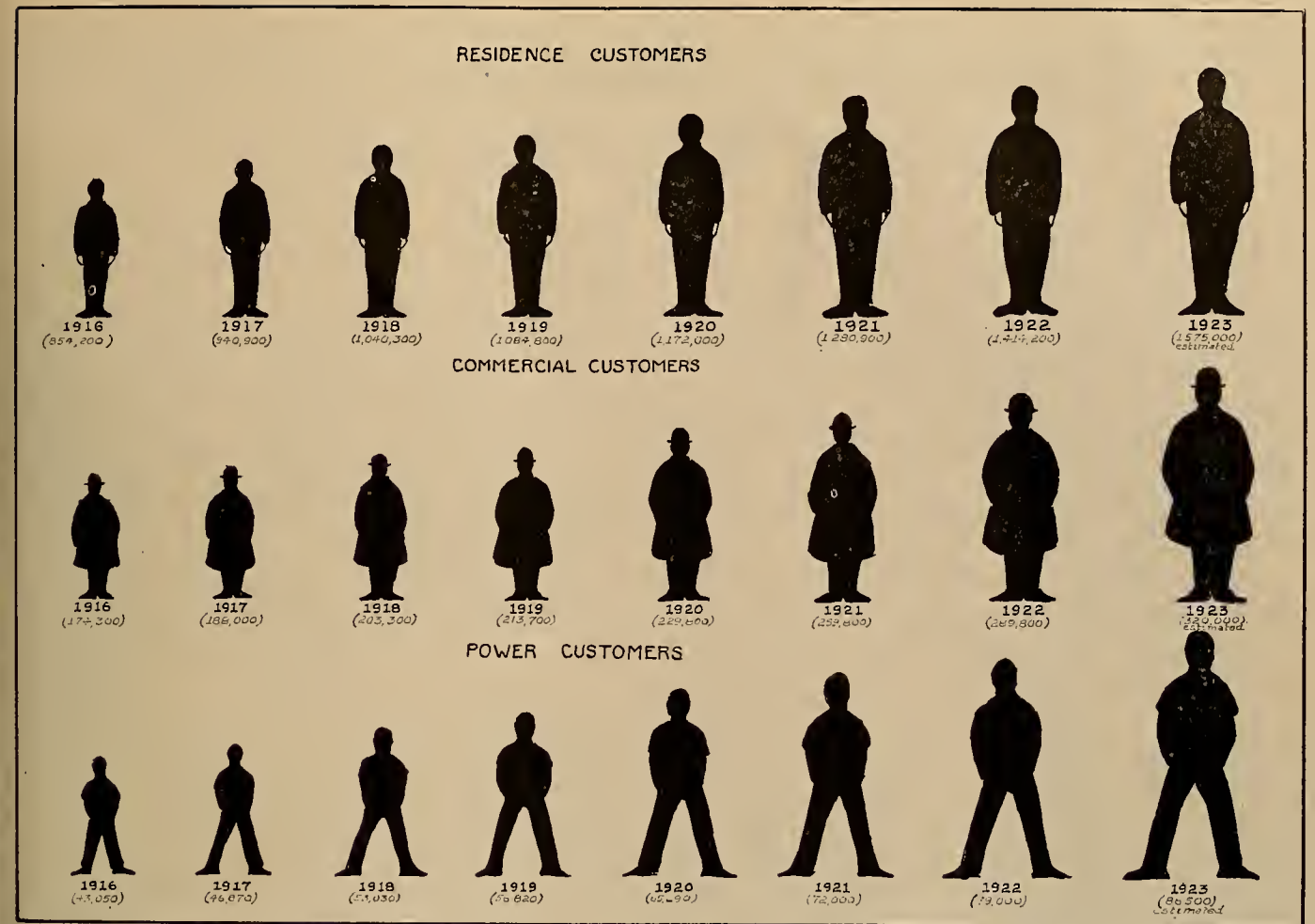
From the estimate of the value of appliances in use in western homes, combined with a record of the number sold during the past five years, the above curve has been established.

year and that something like \$7,000,000 worth of electric washing machines, \$5,500,000 in vacuum cleaners, \$2,000,000 in electric ranges and other equipment in like proportion will find their way into western homes.

The accompanying curve showing the number of appliances in use in the homes of the West indi-




There were 1,414,200 wired homes in the West at the end of 1922, with a prospect of 140,000 additional homes being constructed during 1923



The steady increase in residence, commercial and industrial consumers in the West is indicative of the steadily growing market for electrical equipment in this field

cates that the appliance market may be expected to advance steadily in the future,—that the point of saturation, if any exists, has not been reached. Periods of depression such as that of the past two years, may cause a slight slowing up but increase in population, greater use of electricity due to the educational effects of cooperative campaigns and other agencies, and replacements due to the wearing out of old material or improvements in the design of the merchandise available, are the factors which will be responsible for the steady progress which the future promises.

Electric power has long since ceased to be a novelty in the eyes of the public and the realization has come that the general use of electricity in the home is as essential to modern standards of comfort and convenience as was the substitution of incandescent for oil lamps.



SERVICE POWER CO.
ELECTRIC
1000 1/2 ST.
NEW YORK 10, N.Y.
4000 1/2 ST.
NEW YORK 10, N.Y.
\$3.36
V. L. SPENCER
NEW YORK 10, N.Y.

SERVICE POWER CO.
PUBLIC, V. L. STATE
1000 1/2 ST.
NEW YORK 10, N.Y.
\$3.36

ONE CENT

ONE CENT

ONE CENT

ONE CENT

ONE CENT

ONE CENT

ONE CENT

ONE CENT

ONE CENT

ONE CENT

ONE CENT

- will spend \$28 for electric equipment during 1923

- pays \$3.36 monthly electric bill

- gets complete service of lights and appliances for 11¢ per day

With \$150 worth of electric appliances in use, the average consumer pays about eleven cents a day for electricity,—one of the smallest items in the household account

1923 Hydroelectric Development Program Involves 185,500 Kilowatts

HYDROELECTRIC power development in the West during 1923 promises to set a new high record with a program which involves 357,725 kw. under actual construction, of which 185,500 kw. will be completed and made available for distribution during the year. A review of the past twelve months shows that a total of 138,675 kw. was added to the generating capacity of western companies in this time. Thus it is evident that the West is leading the world in the utilization of the potential power resources available in the melting snows which cover its mountain ranges.

Assuming that for each kilowatt of power developed, \$200 was spent on the plant, dams, and

programs which will be completed or undertaken during the year will more than make up for such expenditures.

A further insight into the hydroelectric development program of the West can be gained from a study of the annual report of the Federal Power Commission, which has just been issued. During the fiscal year ending June 30, 1922, the period covered by the report, a total of 26 permits were issued involving primary projects with a total of 546,995 hp. Similarly, 22 licenses were issued by the commission involving 304,835 hp.

The applicants for permits and the projects which they cover, as well as the recipients of licenses,

PERMITS

| Company | Stream | State | Horsepower | |
|---------------------------------|--------------------------------------|------------|------------|--------------------|
| | | | Primary | Installed Capacity |
| Sound Power Co. | Sultan River and Olney Creek | Washington | 71,400 | 142,800 |
| Big Horn Canyon Irr. & Pwr. Co. | Big Horn River | Montana | 97,070 | 210,000 |
| Hawley, R. W. | Silver Creek | California | 44,680 | 75,000 |
| Wrangell Pulp & Paper Co. | Harding and Grant Creeks | Alaska | 1,280 | 1,500 |
| McDonald, R. G. | Convict Creek | California | 2,000 | 6,250 |
| Baum, Frank G. | Little Colorado River | Arizona | 13,400 | 30,000 |
| Leighton, Joseph B. | Yellowstone River | Montana | 7,700 | 15,000 |
| Ballaine, Frank L. | Kenai River | Alaska | 5,500 | 15,000 |
| So. Sierras Pwr. Co. | Whitewater River | California | 2,400 | 5,000 |
| Hazelet, George O. | Silver Lake | Alaska | 720 | 1,500 |
| Mushen & Cronemiller | Deep and Camas Creeks | Oregon | 230 | 800 |
| Elmore Copper Co. | So. Fork Boise River | Idaho | 6,000 | 6,000 |
| Alaska Dev. & Mineral Co. | Anan and Tyee Creeks and White River | Alaska | 18,200 | 28,000 |
| City of Boise | Payette River | Idaho | 11,950 | 30,000 |
| Alaska Pub. Utilities | Power Creek | Alaska | 1,000 | 1,340 |
| Myser & Drach | Fryingpan Creek | Colorado | 50,000 | 100,000 |
| Uintah Pwr. & Lt. Co. | Pole Creek and Uintah River | Utah | 2,425 | 2,425 |
| Town of Petersburg | Crystal Lake | Alaska | 1,000 | 1,000 |
| Wash. Water Pwr. Co. | Columbia River | Washington | 120,000 | 153,400 |
| Portland Ry. Lt. & Pwr. Co. | Clackamas River | Oregon | 34,000 | 88,600 |
| Galvin, John G. | Aarons Creek | Alaska | 9,800 | 12,000 |
| Ft. Klamath Meadows Co. | Anna Creek | Oregon | 480 | 480 |
| Hughes, John H. | French Creek | California | 2,160 | 4,000 |
| Northwestern Elec. Co. | No. Fork, Lewis River | Washington | 19,400 | 28,000 |
| City of Wrangell | Mill Creek | Alaska | 500 | 500 |
| Hutton, McNear & Dougherty | Cascade Creek | Alaska | 23,700 | 34,000 |

penstocks, \$110 on transmission equipment, \$100 on distribution equipment and \$750 for customers' lamps, motors, appliances and the wiring of homes, offices and factories, an estimate can be made of the capital investment involved both in the program of the past year and that for 1923. Western electric utilities completed a program during 1922 which involved an estimated total of \$1,086,750,000. The generating capacity which will be added to the lines during 1923 will represent an investment of approximately \$1,466,050,000, divided as follows:

| | |
|--|---------------|
| Investment in hydro plants | \$ 37,100,000 |
| Investment in transmission equipment | 20,400,000 |
| Investment in distribution equipment | 18,550,000 |
| Investment in wiring, motors, appliances, etc. | 1,390,000,000 |

While not all of that sum will be spent during 1923 and undoubtedly some of it has already been spent, those parts of past and future development

LICENSES

| Company | Stream | State | Horsepower | |
|--|-----------------------------------|------------|------------|--------------------|
| | | | Primary | Installed Capacity |
| Alaska Eadicott Mining & Milling Company | Lynn Canal | Alaska | 350 | 1,000 |
| Rock Creek Power Co. | Rock Creek | Montana | 1,060 | 1,880 |
| Snow Mountain Water & Power Company | South Fork, Eel River | California | 1,440 | 14,500 |
| Western States Gas & Electric Company | South Fork, American River | California | 6,400 | 8,100 |
| Alaskan-American Power Corporation | Orchard Lake | Alaska | 4,620 | 5,800 |
| San Joaquin Light & Power Corporation | San Joaquin River | California | 10,250 | 45,000 |
| Southern California Edison Company | San Joaquin River | California | 55,000 | 195,000 |
| Eyre, Grace S. | Chalk Creek | Colorado | 560 | 800 |
| Portland Railway Light & Power Company | Clackamas River | Oregon | 25,300 | 30,000 |
| Benefiel, C. S. | Chewaucan River | Oregon | 60 | 60 |
| Wyoming Power Company | Big Horn River | Wyoming | 1,300 | 2,600 |
| Southern Sierras Power Company | Snow Creek | California | 850 | 3,750 |
| San Joaquin Light & Power Corporation | East and North Forks, Kings River | California | 161,000 | 266,000 |
| El Dorado Power Company | South Fork, American River | California | 30,000 | 100,000 |
| Southern Sierras Power Company | High Creek, et al. | California | 1,400 | 4,000 |
| George Inlet Packing Company | Beaver Falls Creek | Alaska | 75 | 90 |
| Cann, J. H. | Cann Creek | Alaska | 60 | 75 |
| Blue Mountain Irrig. Company | Pole Canyon Spring | Utah | 40 | 40 |
| Freshwater Bay Lumber Company | Small stream | Alaska | 100 | 100 |
| Weber, H. | Denny Creek | Colorado | 100 | 100 |
| Karst, Peter F. | Moose Creek | Montana | 20 | 30 |
| Southern California Edison Co. | Kaweah River | California | 4,890 | 9,960 |

The recipients of licenses and the developments covered follow.

during the fiscal year covered by the Power Commission's report, are printed in the accompanying tables. Two of the most noteworthy hydroelectric plants installed in the West during 1922 are: the Pit River No. 1 unit of the Pacific Gas & Electric Company in Shasta County, California, with a capacity of 70,000 kw., and the 12,500-kw. unit of the Copco plant on the Klamath River in Oregon, installed by The California Oregon Power Company.

SOME WESTERN HYDROELECTRIC PROJECTS UNDER WAY IN 1922 OR DEFINITELY SCHEDULED FOR 1923

| Name of Company | Plant | Location | Present or Proposed Installation kw. | Ultimate Capacity kw. | Static Head (ft.) | Present Stage of Development |
|--|--------------------------------------|-----------------------------------|--------------------------------------|---|-------------------|--|
| Pacific Gas & Electric Company | Pit No. 1 | Shasta County, California | 70,000 | 70,000* | 454 | Completed August, 1922. |
| Pacific Gas & Electric Company | Drum (third unit) | Placer County, California | 12,500 | 50,000 | 1,375 | First and second units completed 1913, third unit (12,500 kw.), 1922. |
| Southern California Edison Company | Big Creek No. 3 | San Joaquin River | 75,000 | 150,000 | 855 | First unit scheduled for operation Aug. 1923, third unit, Sept., 1923. |
| Southern California Edison Company | Big Creek No. 1 (third unit) | Big Creek, Fresno County | 16,000 | 64,000 | 2,131 | 32,000 kw. operating since 1913, third unit (16,000 kw.) ready July, 1923. |
| The California Oregon Power Company | Copeo (second unit) | Klamath River | 12,500 | 25,000 | 125 | Second unit completed Nov., 1922. |
| Western States Gas & Electric Company | El Dorado | American River, near Placer-ville | 20,000 | 80,000 | 1,900 | Fifty per cent complete. |
| San Joaquin Light & Power Corp. | Mt. King | Merced River | 350 | Dependent upon future upper development | 57 | Purchased 1922 from Mt. King Mining Co. |
| San Joaquin Light & Power Corp. | Balch | No. Fork Kings River | 31,000 | 115,000 | 2,495 | Roads under construction. Tunnel to be under way in 1923. |
| City of San Francisco | Moceasin Creek | Tuolumne County | 80,000 | 120,000 | 1,315 | Equipment contracted for delivery in 1923. |
| Department of Public Service, Los Angeles | San Fernando | 2 miles west of San Fernando | 7,000 | 7,000 | 230 | Completed, 1922. |
| Department of Public Service, Los Angeles | San Francisquito No. 1 (fourth unit) | Los Angeles Aqueduct | 12,000 | 48,000 | 940 | 36,000 kw. in operation, 12,000 kw. unit added, 1922. |
| Portland Railway Light & Power Company | Oak Grove | Clackamas River | 25,000 | 75,000 | 860 | Wagon road completed, equipment ordered. |
| Salt River Valley Water Users' Association | Roosevelt | Salt River, Arizona | 7,500 | 19,250 | 228 | Preliminary plans completed for increasing present capacity of 11,750 kw. by 7,500 kw. |
| City of Seattle Lighting Dept. | Gorge Creek | Skagit County, Washington | 34,500 | 180,000 | 375 | To be completed 1923. |
| City of Tacoma | Lake Cushman | Lake Cushman, Washington | 45,000 | 120,000 | 600 | Surveys completed, right of ways purchased. |
| Washington Water Power Company | Spokane Upper Falls | Spokane, Wash. | 10,000 | 10,000 | 64 | Completed, 1922. |
| Pacific Power & Light Company | Power Dale | Near Hood River, Ore. | 6,000 | 6,000 | 180 | To be completed April, 1923. |
| Montana Power Company | Mystic Lake | Bear Tooth National Forest | 15,000 | 15,000 | 1,100 | Roads under construction. Work to start late in 1923. |
| Utah Power & Light Company | Grace | Grace, Idaho | 11,000 | 44,000 | 525 | Fourth unit being added to present 33,000 kw. capacity. Practically completed. |
| Utah Power & Light Company | Olmstead | Provo, Utah | 5,500 | 12,700 | 369 | 5,500 kw. unit added during 1922. Former capacity 7,200 kw. |
| Utah Power & Light Company | Soda | Alexander, Idaho | 15,000 | | 85 | Under construction. |
| Pacific Mills Ltd. | Ocean Falls | Ocean Falls, B. C. | 4,700 | | 140 (Av.) | |
| City of Eugene | McKenzie | McKenzie River, Ore. | 1,500 | | 50 | Bids received, contracts to be let immediately. |
| San Geronio Power Company | No. 1 | San Geronio River, Cal. | 1,750 | 1,750 | 1,775 | Hydro equipment contracted for. Work under way. |
| San Geronio Power Company | No. 2 | San Geronio River, Cal. | 775 | 775 | 900 | Hydro equipment contracted for. Work under way. |
| Yuba Development Company | Bullard's Bar | Yuba River, Cal. | 8,000 | 16,000 | | Work started on plant and dam to be completed 1923. |
| Modesto-Turlock Irrigation District | Don Pedro | Tuolumne River, above La Grange | 15,000 | 70,000 | 160 to 240 | Dam completed, plant to be in service early in 1923. |
| Merced Irrigation District | Exchequer | Merced River, Cal. | 25,000 | | 310 | Preliminary work under way. |
| Electro Metals Corp. | No. 1 No. 2 | Klamath River | | 67,000 17,000 | 250 75 | Surveys and preliminary plans completed. |
| British Columbia Electric Railway, Ltd. | Stave Falls (fourth unit) | Ruskin, B. C. | 8,825 | 35,400 | 110 | Fourth unit added during 1922. |

*Total for Pit River approximately 450,000 kw.

The Pacific Coast Superpower Zone

COULD a kilowatt be isolated at Yuma, Ariz., equipped for travel with a through ticket and a clear line, it would be possible to transfer it to Albany, Ore., over approximately 1,200 miles of copper, comprising the backbone of a superpower system whose annual kilowatt-hour output is almost one-tenth the total annual consumption of electrical energy in the United States, and whose network of transmission and distribution lines exceeds half the total railway mileage of America. While the East has been talking and agitating a superpower system in the Boston-Washington district, western public service companies have gone quietly about the business of interlinking their lines until at the present time there has been built up an interconnected network which covers three states and which, within the next eighteen months, will cover the entire Pacific Coast, from the Mexican border to Puget Sound.

The Pacific Coast Interconnected Transmission System at the present time comprises all of the major California power companies and two of the important Oregon utilities. Plans are now under way for the closing of the two remaining gaps in the Pacific Northwest and when this is done there will then exist a superpower system whose main trunk will be approximately 1,800 miles long, whose generating capacity, both steam and hydroelectric, will be 1,640,170 kw. and whose annual output will be 5,779,607,297 kw-hr. Were this system to be transposed to the Atlantic seaboard, it would serve a territory extending from Quebec, Canada, to Charleston, S. C.

The lines of the system cross barren deserts, traverse fertile valleys and wooded hills, and finally climb through a pass in the Sierras to carry power to the Nevada mines. They are fed by steam plants fired with oil and natural gas, hydroelectric plants whose generators are turned by waters from the eternal Sierra snowbanks or from the never-diminishing springs of the Pit River. Even the vagaries of nature are overcome, for in years when rainfall is light in the South and water scarce, power can be sent from the Northwest to make up the resulting shortage.

Economy and the lack of power to supply peak demands have been two of the principal reasons for the interconnecting of the lines of the western companies. Hydroelectric energy has been plentiful and comparatively cheap but it is essential now that greater use be made of the investment in electric public utilities, for the time is not far distant when the demands for service will far exceed the ability of the industry to command the necessary funds with which to provide that service. Efficiency in the use of money is as desirous and necessary as economy in the use of fuel, oil and water, and the public has come to demand that the industry show the same skill in the use of one as in the other. It is evident

then that the problem facing the electric public utilities is most broad and embraces the conservation of fuel, water, labor, money, materials and human endeavor. In a measure, interconnection embraces all of these and most of the advantages to be gained by it have already been demonstrated by those western companies whose systems have been linked.

The beneficial effects of interconnection may be summarized as follows:

1. Interconnection makes possible the fullest utilization of water powers and watersheds through exclusive hydroelectric systems or in hydroelectric systems possessing steam-electric auxiliaries. Advantage can also be taken of the diversity existing between watersheds and water storage.

2. Interconnection increases the load which may be carried on otherwise separate systems owing to diversity of peaks, the increase ranging from 15 to 30 per cent.

3. Interconnection enables a generating system to operate with less equipment in reserve, and in some cases no reserve need be provided, for the system is sufficiently large to care for any demands which might be made on it.

4. Fuel can be saved in considerable quantities on steam-electric systems which are tied-in with hydroelectric systems.

5. Interconnection makes possible a greater utilization of an investment by providing for a load for the equipment before the local market can absorb it. One year one system may have a surplus, owing to the installation of new equipment, and the next year the situation may be reversed with the neighboring company possessing the surplus.

While the western utilities which comprise the interconnected system have enjoyed many of the above advantages, the interchange of power has been practically limited to adjoining companies, whose transmission lines are linked. To gain the maximum benefits, the interconnections must be made on a grander scale with tie lines and switching equipment at junction points of sufficient capacity to allow the transfer of large blocks of power from one company to another whose lines are not adjacent, the transfer being made over the wires of a third company. The flexibility attainable by means of such interconnections amply warrants the practice.

Some idea of the immensity of the present interconnected system existing on the Pacific Coast can be gained from the figures it involves. The present system includes the lines of eleven major companies, and one municipality, involving a total steam generating capacity of 402,150 kw., and a hydroelectric generating capacity of 839,990 kw. The annual output of the system for the year ending Dec. 1, 1922, was 4,330,640,821 kw-hr. The companies which contributed to this output and the amount of power generated by each follow:

| | Kw-hr. |
|---|---------------|
| San Diego Consolidated Gas & Electric Co..... | 67,836,308 |
| Southern California Edison Co..... | 891,334,000 |
| Southern Sierras Power Co..... | 187,827,750 |
| Los Angeles Dept. of Public Service..... | 242,787,000 |
| Los Angeles Gas & Electric Co..... | 91,270,995 |
| San Joaquin Light & Power Corp..... | 447,000,040 |
| Pacific Gas & Electric Company..... | 1,599,325,067 |
| Great Western Power Company..... | 553,066,470 |
| Snow Mountain Water & Power Co..... | 52,082,080 |
| Western States Gas & Electric Co..... | 29,817,160 |
| California Oregon Power Co..... | 133,700,038 |
| Mountain States Power Co..... | 34,593,913 |

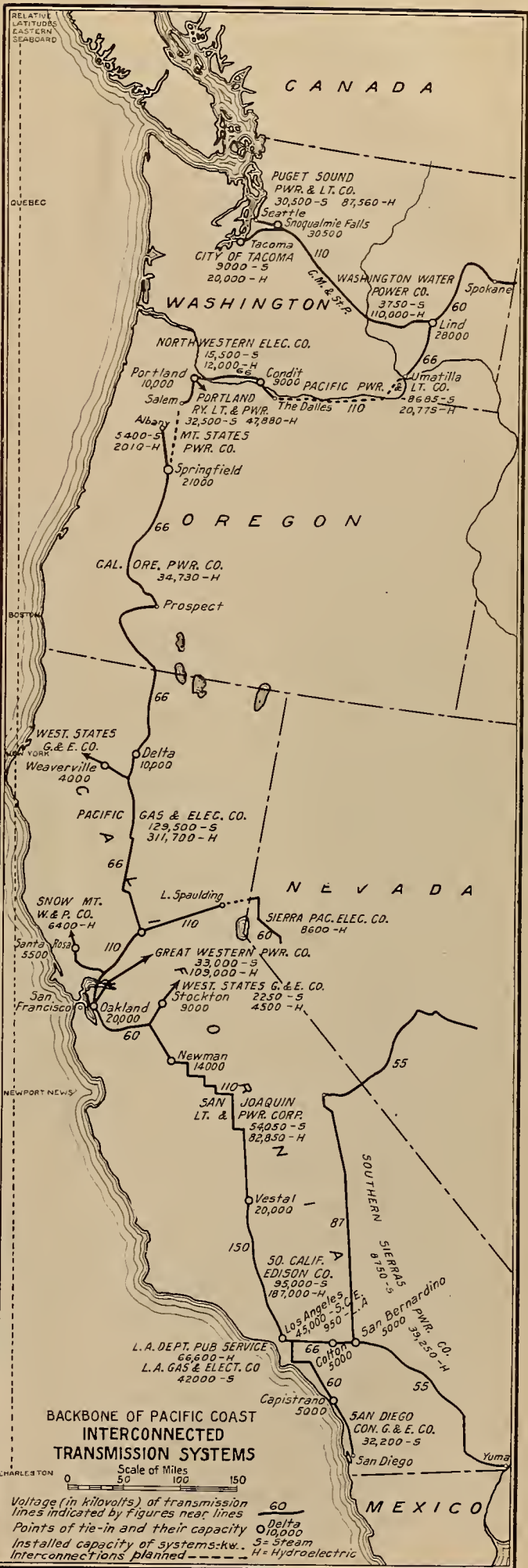
At the present time there are two gaps, as shown in the accompanying map, existing in the system which must be closed before the lines of the Pacific Northwest will be tied-in with those of California. There is a transmission line at the present time between Springfield, Ore., and Salem, which is the property of the Oregon Electric Company, and which operates at 33 cycles. The lines of the Mountain States Power Company and The California Oregon Power Company, which are joined at Springfield, both operate on 60 cycles. The Oregon Electric Company, which receives its power from the Portland Railway, Light & Power Company, is installing twelve automatic substations which will operate on 60 cycles, and upon the completion of this installation, it is planned to interconnect with The California Oregon Power Company at Springfield.

The second gap exists between two of the divisions of the Pacific Power & Light Company. Surveys are being made for a line along the banks of the Columbia between The Dalles and Umatilla and officials of the company predict that the line will be completed within the next eighteen months. When these two gaps are closed there will be added to the interconnected system 99,815 kw. in steam generating capacity and 298,215 kw. in hydroelectric generating capacity. The total capacity of the system, exclusive of additions which are scheduled to be made during the next year, will then be 1,640,170 kw., both steam and electric. The annual output will then be 5,779,607,118 kw-hr. The companies of the Pacific Northwest which will contribute to the total have produced during the year ending Dec. 1, 1922, the following amounts of power:

| | Kw-hr. |
|---|-------------|
| Puget Sound Power & Light Co..... | 464,571,297 |
| City of Tacoma | 104,471,074 |
| Washington Water Power Co..... | 402,967,000 |
| Pacific Power & Light Co..... | 39,662,326 |
| Northwestern Electric Co. | 117,864,900 |
| Portland Railway, Light & Power Co..... | 319,429,700 |

Interconnection, then, as far as the Pacific Coast is concerned, is an accomplished fact. Quietly, without the blare of trumpets, there is being built up a superpower system which eclipses anything in the world, — a system which will serve four states and a population of approximately 5,560,871.

PACIFIC COAST INTERCONNECTED SYSTEM
Feeding a portion of three states, the interconnected transmission lines of the Pacific Coast central stations comprise a superpower system that has no equal in any part of the world.



Outlook for Electrical Industry in the West for 1923

IN ORDER to present to its readers a forecast of the electrical industry in the West for 1923, the Journal of Electricity and Western Industry directed a questionnaire to a selected list of leaders in each branch

of the industry. While specific questions were propounded, those addressed were requested to express their views also on any other phase of the electrical industry which they considered to be of sufficient importance to warrant special attention.

The subject matter following discusses the outlook from the viewpoint of the central station, the manufacturer and jobber, the manufacturers' agent, the contractor-dealer and cooperative campaign.

MANUFACTURERS AND JOBBERS

What will be the channels through which electrical appliances will be distributed in the future?

J. I. Colwell, manager supply department of the Western Electric Company at Seattle, writes that his company has made many attempts to create a market for electrical appliances that would be great enough to satisfy all jobbers and manufacturers of electrical appliances. He believes that there has been an attempt to force the purchase of electrical appliances too fast. When the housewife who does her own work hears the door bell ring she is inclined to say, "There's another vacuum cleaner salesman." She has been solicited vigorously to purchase vacuum cleaners and other appliances at a time when conditions were not prosperous enough for her to purchase, even though she had the desire, and while times are now becoming better, a certain resistance has been created against the purchase of appliances through the "door to door" method. In his opinion electrical appliances in the future will be sold through electrical dealers, housegoods furnishing stores, department stores and central stations.

T. W. Simpson, vice-president of the Federal Electric Company of San Francisco, expresses a similar opinion to that of Mr. Colwell. He believes that the future will show that electrical appliances will be distributed by contractor-dealers, specialty dealers concentrating on one line, central stations, and hardware, house furnishing and department stores. He believes that the electrical appliance field is far from saturated and that it now lacks sufficient points of contact with the purchasing public. It will do no harm to any branch of the industry to have all agencies mentioned above selling appliances. On the contrary, it will do a great deal of good because all will be engaged in selling the appliance idea to the public

A symposium of the views of leaders of each branch of the industry indicates that 1923 will mark a new era of electrical progress in the West.

and this will reduce the sales cost to all concerned.

Carl E. Heise, district manager for the Westinghouse Electric & Manufacturing Company of San Francisco, differs, in that he believes that the contractor-

dealer may become the principal channel of distribution. Mr. Heise states that during the last few years, the electrical contractor-dealer has established himself as a merchandiser in addition to his capacity as a mechanic, with the result that merchants in other lines can learn much from him. However, the contractor-dealer must realize his responsibilities as a merchant. This calls for central business locations with well kept stores, attractive window displays, and suitable stocks of nationally known products backed by responsible manufacturers. Consistent following of such a policy should insure the electrical contractor-dealer's becoming the main channel of distribution for all electrical merchandise.

A. S. Moody, assistant Northwestern manager for the General Electric Company at Portland, Ore., believes that the electric appliance is becoming more and more a standardized article of merchandise and as such is being distributed through the general retail merchants of household articles, such as hardware stores and department stores. The tendency to buy household articles at such stores is a natural one. To counteract this trend, it is necessary for the electrical retail stores to make their service on appliances superior to that of the more general outlets, and at the same time to bring their merchandise methods at least up to a par with the hardware and department store. This action is imperative if they expect to maintain their position as distributors of electric appliances.

What part should the central stations play in the marketing of appliances?

J. I. Colwell believes that the central stations, when they market appliances at a profit and follow the market in their selling prices, stimulate the sale of appliances and help the business of other dealers and stores. Where the central stations do not sell appliances at a profit and follow the market, they are not doing a constructive work and they jeopardize the existence of the electrical dealer. This they cannot afford to do.

T. W. Simpson expresses the opinion that central stations should actively operate electric shops but that they should be under the direct supervision of an official who will not permit it to take advantage of competitors due to the weight of authority that goes with the central station name. If it were not

for overzealousness on the part of many managers of central-station electric-shops, this whole agitation as to whether or not the central station should engage in merchandising would never have started. The principles governing a central-station electric-shop should be, (1), selling at prices to make profit, (2), concentrating on one make of article in each division of the appliance field so that other dealers may take exclusive contracts with the other makes, (3), extending to its dealer friends in the same town the advantages of its mailing list and of its collection facilities, (4), by means of advertising and outside solicitation, undertaking the chief burden of selling the idea that electrical appliances are useful and desirable.

In the opinion of A. S. Moody, is is the part of the central-station to pioneer electric appliance distribution. The exploitation of new appliances, which entails considerable expense, cannot be borne on the margin of profit obtained by the electrical dealer, and consequently such new devices, in order to obtain quickly the results desired, must be pioneered by the concern which is most vitally interested in their exploitation—i.e., the central-station.

What solution can you offer for the problem of servicing household electrical appliances?

J. I. Colwell considers that the servicing of electrical appliances should be taken care of by the central-station, housegoods furnishing store, department store or by the electrical dealer himself. Where the company that sells the appliances maintains a servicing department it means that that company, because of its experience in servicing, has a better knowledge of the appliances themselves. This eventually brings about the more intelligent selling of the appliances. Where the appliances are intelligently sold the servicing of the appliances is reduced to a minimum, because most of the need for servicing of appliances is due to the fact that the purchaser does not properly understand them and was not properly sold when he first purchased the appliances.

T. W. Simpson says that the best solution is that at Salt Lake where the central station operates a "fix-it" department where all makes of goods, whether sold by the central station or by dealers are repaired for a nominal charge. This is the best means of preventing what has been called the "shelf connected load."

Carl E. Heise believes that it is to the interest of the central station to see that appliances are maintained in usable condition at a minimum expense to the consumer. While the manufacturer and distributor are vitally interested, it is probable, because of the more frequent and intimate contact between the central station and the consumer, that the central station should take the lead in the solution of this problem.

A. S. Moody states that the solution rests not in placing the burden on any one of the agencies exploiting their sale, but it should be handled jointly. The principal advantage of the electrical retail merchandiser over his technical competitor is his familiarity with the construction and use of appliances.

He can sell more intelligently, and service more intelligently, than the general retail dealer, and he should capitalize this argument in maintaining his position in the retail field.

The central station must do its part to assist in servicing and the manufacturer should provide in the principal centers, if not a service station, at any rate a stock of repair parts which would be quickly available to avoid delay in effecting repair.

Is the present cost of distribution of electrical appliances too high and, if so, how can it be reduced?

J. I. Colwell does not believe that the present cost of distribution of appliances is high and believes that the dealers should have a profit large enough to make it worth putting forth enough sales effort to get a substantial volume of sales. Satisfactory service by the dealer is a factor in increasing his sales.

T. W. Simpson expresses the opinion that the present cost of distribution is too high and it can be reduced if the central station will operate sample electric stores on sound business principles and undertake the main duty of selling the idea, leaving it to electrical stores and dealers to sell the particular device.

A. S. Moody believes that the distribution cost of electrical appliances at present is not excessive, particularly in comparison with marketing costs of similar electrical commodities. Some distributors of household goods do not handle certain electrical devices because the margin of profit is less than their cost of doing business. When the technical nature of the business is considered and taking servicing charges into consideration, he does not feel that the distribution cost of this material is excessive.

What is the outlook for an enlarged market for electrical appliances and apparatus for 1923?

J. I. Colwell states that the present indications are for a better market for electrical appliances and apparatus in 1923 in the Pacific Northwest. The lumber business is the backbone of the Northwest and because of the building program throughout the country for this year the lumber business is sure to be prosperous.

T. W. Simpson believes an enlarged market can come only from enlarged consumption.

A. S. Moody says that in his opinion the market available for electrical appliances in the year 1923 will exceed that of any year with the possible exception of 1920, in which year the manufacturers were unable to supply the demand, and it is his opinion that this year will see somewhat the same conditions in that the manufacturers will be considerably oversold.

CENTRAL STATIONS

What steps are you taking or planning to take to market your surplus power, developed or in process of development?

R. E. Fisher, vice-president in charge of sales for the Pacific Gas & Electric Company, San Francisco, states that 1923 will see a more intensive and

concerted effort on the part of his company toward creative sales through the rise of high class technical sales engineers, who will develop new uses for electricity, and use every endeavor to load up existing facilities. The major undertakings will be illumination, industrial applications of electricity for heating, and an intensive electric range campaign with a bogie of 2,500 ranges for the year.

A. C. McMicken, sales manager of the Portland Railway, Light & Power Company, Portland, Ore., states his company now has under way the development of its sixth hydroelectric generating plant, this development being known as the Oak Grove project, which by the summer of 1924 will give an additional 25,000 kw. 365 days a year. Additional units of the Oak Grove project will be developed as needed until an ultimate capacity of 100,000 hp. continuous power has been developed. At the present time they have no surplus power in the strict sense of the word, but are able to take care of their rapidly growing load by the purchase of power and by the addition of steam auxiliaries before next low water season.

A. W. Childs, manager commercial department, Southern California Edison Company, writes from Los Angeles that "the plans of the Southern California Edison Company for new business development during 1923, are based upon signing a minimum of 100,000 hp., in additional lighting, cooking, heating and power. This will mean an increase of approximately 15 per cent in connected load. There is every reason to believe that the large industrial, commercial and residential development realized in California in 1922, will continue undiminished during 1923. A careful survey of business possibilities in the 28 districts in central and southern California served by the Southern California Edison Company, shows that there is a ready market for this large amount of power."

W. R. Putnam, vice-president and general manager of the Idaho Power Company, Boise, Idaho, states that "the territory served by the Idaho Power Company is dependent primarily for its prosperity upon agricultural conditions. The year 1922 has shown a slight improvement over 1921, but so-called normal growth of this territory cannot be reached until the buying power of the farmer has been restored either by an increase of approximately 50 per cent in the price levels of his products or with a corresponding reduction in the cost of goods which he necessarily purchases, or a combination of increase in the price of his products and a reduction in his costs sufficient to obtain the same end."

He anticipates that the year 1923 will show considerable progress in this direction, with the resulting improvement in business conditions in his whole territory. He expects that business will show an increase between 10 and 15 per cent over 1922.

H. J. Gille, sales manager of the Puget Sound Power & Light Company, Seattle, Wash., writes that he does not think it is good business to talk of marketing surplus power unless in fact he means literally surplus power. Unlimited power service over and above the present power station load up to power

station capacity should not be classed as surplus power for the reason that, "I think it creates an erroneous impression in the minds of prospective customers." The market for real surplus, such power as is available outside of the hours each day or the hours in the year when the service is not used by regular customers, is a rather difficult business to develop, depending, of course, on what available market there may be for such surplus. The market for this in the Pacific Northwest is rather limited.

What steps are you taking to stimulate consumer ownership?

A. C. McMicken writes, "The company has been selling since Jan. 1, 1922. 7 per cent prior preference stock and maintains and operates its own investment department for the sale and resale of its securities. It is our desire and idea to do all our junior financing as much as possible through the sale of prior preference stock to our consumers and people living in the territory we serve."

F. L. Greenhouse, securities agent for the Southern California Edison Company, writes from Los Angeles, "We expect to continue our campaigns as in past years and for 1923 expect to add, approximately, 18,000 new stockholders to our present list of 49,000 stockholders. The security which we will offer this year will be our 7 per cent cumulative preferred stock at an initial price of \$105 per share cash, or \$106 on the installment plan. As market conditions warrant, the price of this stock will probably be increased from time to time. The method used for the sale of this stock will be the same as in the past, namely, the sales will be made by the employees of the company direct and without the intermediary of any brokerage or bond houses whatever."

W. R. Putnam says, "During the past year, without any active campaign, we have secured better results as to increase in customer ownership of our stock than at any time during the several years in which we have quietly placed our preferred stock with our customers. Our success in this particular, while not representing sales of large amounts of stock, has so encouraged us that in the early spring we will start an active campaign for customer ownership. In the Pocatello division of our territory, we are planning to install two 6,000-kw. outdoor-type units. On our interconnected system we plan to extend our main transmission line now extending 114½ miles from Thousand Springs to Caldwell, on from Caldwell to Ontario, Ore. This extension will be built for 132,000-volt operation, but, temporarily at least, will operate at 66,000 volts."

H. J. Gille says, "We propose to continue during the next year our campaign of customer ownership that we have had in the past."

Are you considering the inauguration of a special campaign to increase the use of electricity in the home? What steps do you plan to take during 1923 to popularize electric cooking?

R. E. Fisher states, "We are considering special measures to increase the use of electricity in the home, primarily for electric range and water heating."

A. C. McMicken writes, "We have not contemplated any special campaign to increase the use of electricity in the home other than an intensive campaign to sell electric ranges and water heaters. The total kilowatt-hours used in the home has increased approximately 73 per cent in 1922 over the year 1918. During this year we will conduct, with the cooperation of range manufacturers, electric cooking schools, while advertising in various ways the advantages of electric cooking. Following out the precedent established during 1922, we will send to every home builder suitable letters and literature pointing out the necessity for complete and proper wiring in new homes and the advantages of electric cooking. We are optimistic over the future of electric cooking in the territory we serve and we now have in service approximately 2,000 electric ranges."

A. W. Childs states that the sale of household labor saving devices will be handled largely by the electrical contractor-dealers with the Southern California Edison Company lending active support and cooperation. The electric ranges and water heaters will likewise be sold by the electrical contractor-dealers, but the Edison company will also devote considerable energy and time to selling to its consumers, the idea of cooking by electricity. Electric range salesmen will cover the field in a systematic way, easy terms of payment will be allowed, and the company will assist the contractor-dealer in financing the sale and installation where necessary. Illumination will be given considerable attention, including better lighting of homes, stores and factories, display windows, flood lighting, electrical advertising and street and highway lighting. All departments of the company are cooperating in making 1923 a banner year in new business signed.

H. J. Gille says, "I feel that by far the largest opportunity for any one class of service to develop increased business is in electric cooking and we have plans under way for prosecuting an electric cooking campaign in 1923."

CONTRACTOR-DEALERS AND COOPERATIVE CAMPAIGNS

What can the contractor-dealer do to get his share of the prosperity which 1923 promises?

How can the contractor-dealer play a leading part in the spreading of the electrical home idea?

How can the evil of destructive competition be overcome?

Responses were general; in fact, they indicated that the questions were so closely allied to one another as to be practically one.

S. W. Bishop, executive manager of the Electrical Cooperative League, Denver, Colo., writes, "In the Rocky Mountain region and in Colorado especially, industrial projects and building activities

started during the past year promise a continuation and an increase. The unprecedented building boom of 1922 in Denver has given a strong feeling of optimism which thus far even winter weather has been unable to dampen.

"All agree, however, that the real test of business in any line is not volume by itself but rather the profit exacted from it and here is where the electrical industry can rehabilitate itself during the next eleven months. With plenty of business to go round, from the present viewpoint, it would seem that there is ample time to decide on getting a profit. A definite policy of this character will work wonders for manufacturer, jobber, and contractor-dealer alike."

Rey E. Chatfield, secretary-manager of the Electrical Service League of British Columbia, Vancouver, B. C., says, "Building activity in British Columbia up to the present time has been confined to home construction, but beginning the new year of 1923 larger projects will be started. Already this year the drawing of plans for over \$5,000,000 worth of construction has been authorized, with the probability of this total reaching at least \$20,000,000. This new construction will benefit the electrical industry, and primarily the contractor-dealer. For example, the central station has authorized the expenditure of over \$1,500,000 for construction purposes for the new year. This includes a high tension line to supply the Britannia Mining & Smelting Company, Ltd., with a 5,000-hp. service. The new high tension line opens up considerable new territory not yet served by central station lines; notably, the municipality of West Vancouver, with some 900 homes in the first district to be served.

"Construction will start on grain elevators, a large flour mill, office buildings and several apartment blocks. The Canadian Pacific Railway Company is opening a new tract of land for subdivision into building lots, and will offer long term payments on loans for the erection of medium priced homes.

"The evil of curbstone competition has been largely overcome through the absorption of many of the curbstones by the larger contractor shops and by the education of the small contractor desiring to remain in business for himself, to the point where he finds it advantageous to do less business and make a profit on the work he does. To my notion, the electrical contractor in British Columbia, and particularly in Greater Vancouver, faces the most prosperous year since the War."

Earl Browne, president of the California Association of Electrical Contractors and Dealers, San Francisco, Calif., says, "All three queries can be answered by the word WORK, but as you say, 1923 only holds out promises, hence speaking individually and unofficially, don't let us 'Coue' ourselves into imagining something is, that isn't."

MANUFACTURERS' AGENTS

What are the obstacles confronting the manufacturers' agents at the present time?

J. G. Pomeroy, of Los Angeles, writes, "The obstacle confronting manufacturers' agents at the present

ent time on the Pacific Coast is stock. It may be we are too far from the source of supply and business, nearer factories are getting the preference. I think the first six months' business in 1923 in California, Washington and Oregon will be the largest in the history of the electrical industry."

L. Brandenburger writes from Salt Lake City, "The manufacturers' agent should be considered as true a representative of his principals as though he were working exclusively for one manufacturer and being paid a regular salary by such manufacturer. That some purchasers do not consider him in such a light, that some manufacturers do not look upon him in the same relation as their salaried officers and that some manufacturers' agents do not conduct their operations in such a way as to bring about the impression that the proper relations exist between him and his principals, introduce obstacles in the way of his creating more business for the manufacturer and enlarging the markets in which the consumer can intelligently buy.

George A. Gray, of Geo. A. Gray Company, manufacturers' representatives, San Francisco, Calif., gives as his opinion, "The only real obstacle is a lack of opportunity for orders at a profit, and surely there is a greater opportunity for orders now than for a long time. Eastern markets have improved wonderfully, surplus stocks have disappeared and in their place are large back-order lists. This means that the dumping of much overstock and inferior material will cease, has ceased, as a matter of fact. Further, the railroad freight embargoes make the prompt and satisfactory movement of small lot shipments practically impossible, eliminating the type of agent who has nothing to lose but the commission on an order which he takes direct and no business responsibility beyond the necessity of earning his keep."

Will anything hinder the manufacturers' agent from making prompt deliveries during 1923?

Are the present freight rates satisfactory and what is the situation relative to ocean shipments?

Do collections and credits promise to be satisfactory during 1923?

J. G. Pomeroy says, "Many things will hinder the manufacturers' agent from making prompt delivery during 1923. The present all-rail freight rate to the Pacific Coast is too high. Water shipments are hindered on account of docking facilities in Boston, New York and Baltimore on the east coast and docking facilities in Los Angeles harbor. Collection and credits will be perfectly safe during 1923 to those who are selling the jobber. I think the electric contractor and dealer as a credit risk will improve, owing to the excellent educational work that is being done by the cooperative campaign."

L. Brandenburger gives as his opinion, "The manufacturers' agent looks forward to considerable increased business in 1923. Both factory shipments

in 1923 and deliveries by the carriers should improve. As the manufacturer approaches normal capacity his shipments become more dependable. Although deliveries from points west of the Mississippi River have not suffered to the degree that shipments from east of the Mississippi River have, the expected improvement in railroad conditions will improve all deliveries. The present freight rates to the Intermountain territory do not adequately meet competition where the shipment originates near the Atlantic seaboard. This condition, however, affects materials that are stocked by jobbers rather than movement of machinery for immediate use.

"Collections and credits will show a decided improvement in 1923. The ultimate consumer is rapidly getting back to a cash basis and keeping his purchases within his means. The main industries, mining, sugar and agriculture in the Intermountain country suffered from the recent financial depression and from market conditions, but those manufacturers' agents who have weathered the storm can look forward to a return of prosperity in the near future."

H. L. Eicher, of Eicher & Bratt, Seattle, Wash., gives an optimistic view of the outlook in the Pacific Northwest territory. He says, "While the return of prosperity has been heralded for some time and has actually been felt in many lines, I believe that in 1923 it will become a real and tangible thing. Larger payrolls will bring the general public to spend more freely. The result will improve business and will restore credit and collections to their normal status. The manufacturers' agent on the Pacific Coast should prepare his principals for an active demand. The eastern manufacturer who already has an agent here who contemplates such a connection should visit this section and get a closer contact with the people he endeavors to serve or contemplates serving. I believe that this is the most important and best move for the manufacturer and agent. If decision is made to enter this field it should be made wholeheartedly and with a definite plan. Full confidence should be established in the agent selected and accurate knowledge obtained as to local conditions and competition and as to the volume of business that might be expected."

C. D. LaMoree, of Clapp & LaMoree, San Francisco and Los Angeles, also expresses an optimistic view when he says, "Observations of conditions in the East indicate an increasing business for that section, and somewhat higher levels of prices for a large number of the commodities entering into the manufacture of electrical apparatus. The expressions of a number of manufacturers indicate that their 1923 business will be better than 1922. Western requirements will be greater in 1923 and Western business will be better, strictly in accordance with the ability of the West to provide the industry with the necessary materials. Never before were the opportunities for the manufacture of commodities supplied to the electrical trade so great as they are in the West today."

JOBBER, DEALER AND SALES AGENT



Selling Electrical Outlets to the Home Builder

A History of the Events which Led to the Adoption of the "Check" Seal Campaign on the Pacific Coast

By D. E. HARRIS,

Vice-President and General Sales Manager, Pacific States Electric Company

The year 1921 marked a crisis in the electrical industry, as it did in many others. The demand for electrical appliances, wiring and fixtures had visibly declined, and this coupled with sharp breaks in selling prices resulted in an alarming shrinkage in volume of sales.

During this period building operations were at a low ebb, and thousands of men employed in the building trades were out of work. Many electricians were thus affected and quite a few went into the electrical contracting business on their own responsibility, securing their supplies on credit and their contracts solely on the basis of price, this in turn still further demoralized the electrical industry.

Under these circumstances the Pacific States Electric Company found itself faced with the necessity of supporting its volume requirements, and of protecting its future market.

In approaching this problem the officials of the company first took full recognition of the economic factors involved. In 1920 practically all markets were clamoring for goods and the sole problem of the jobber was to get them from the manufacturer and within the reach of the consumer, but in 1921 this condition was reversed and an additional and most important function had devolved upon the jobber, namely, to develop his market.

Primarily, of course, it was apparent that the business of the electrical industry depended in a great measure upon new installations; and that nothing could be done, individually or collectively, to increase them, since this is controlled by basic economic factors which ordinarily cannot be influenced. What then would constitute the basis for co-ordinating the factors upon which the industry must rely?

It was decided to make a comprehensive survey in a specific territory, in order to determine to what extent the rapidly increasing number of casual contractors were affecting the stability of the market. The City of Los Angeles was selected for this survey, and an arbitrary grouping was made of all the electrical contractors operating in that territory. Those representing good workmanship, standard materials and fair prices were considered in one group, and the casual contractors in another. Naturally, in making such a grouping some casual contractors may have been

classified under the Qualified Group and vice versa, but averages developed over a long period of time will compensate for this error and give a sound basis for establishing relative values.

Comparative figures were then gathered as to the number of jobs and outlets installed by these two groups of contractors since January, 1920. The figures indicated that in 1920 the Qualified Group had considerably the best of it, both as regards the number of jobs and outlets installed. Their tendency, however, was downward. By this, it is meant that the Qualified Group were at the peak of their performance in the early months of 1920. Starting with May their monthly percentages

The Mountain that came to Mohamet

HERE on the Pacific Coast the mountain has come to Mohamet. True, our lofty ranges stand as unmovable as those of the ancient legend, but the power of their falling waters has been converted into electric energy and transported at will by the Power Companies of the West.

Had Mohamet's futile attempt to move the mountain been successful, its value would have been insignificant compared to this accomplishment. It is an accomplishment combining vision and constructive effort with the courage to assume responsibility for the enormous expense involved.

Nor is there any halt in the effort nor any relaxation of responsibility. New developments and the vigorous maintenance of this vast system requires the daily attention of thousands of men and the highest type of technical skill.

Cheap and abundant power is an established fact and one of the greatest assets of the West, but its value to industry, farms and homes depends largely upon the electrical contractor-dealer who makes the installation, and upon the materials he uses.

To secure an installation which will provide real electrical service go to a "Check" Seal contractor-dealer. These men operate on the basis of good workmanship, standard materials and fair prices. They are qualified to make an installation which conforms to these requirements in every respect.

"Check" Seal contractor-dealers are identified by the "Check" Seal of the Pacific States Electric Company, the largest distributor of electrical merchandise on the Pacific Coast, a mark which also identifies the complete line of standard electrical materials and appliances they sell.

Various items of a complete line of standard electrical materials and appliances served by the "Check" Seal and sold by qualified electrical contractor-dealers, are described in our new booklet, "The Electrical How for Householders." You will enjoy this booklet, with its many practical suggestions for the convenient and economical use of electricity in your home. It may be obtained free from any electrical contractor or dealer displaying this seal or by writing to one of our offices.

Go to dealers and electrical contractors who display the "Check" Seal

PACIFIC STATES ELECTRIC COMPANY

OAKLAND LOS ANGELES SAN FRANCISCO SEATTLE PORTLAND SPokane

Ask for the "Check" Seal

An attempt was made in this advertisement to make the home builder realize the extra value given by the quality contractor-dealer, who displayed the "Check" Seal

steadily declined, so that in December they had dropped below the Casual Group in the total number of jobs installed.

This downward movement became more aggravated in 1921. The Qualified Group steadily declined in the number of jobs and outlets installed, so that by October, 1921, they had dropped to a point where they were installing considerably less than half of the total number of jobs and outlets.

The next phase of the analysis was to determine the tendency in relation to the number of outlets being installed per job. The 1920 general average was 13½ outlets per job—the average for the Qualified Group being 14 for the year, and that of the Casual Group a fraction under 13. In 1921, however, although the Qualified Contractors very closely paralleled their performance of 1920, the average number of outlets per job being installed by the Casual Group took a decided fall, varying between 6.8 and 10.6 outlets per job. The fact that the Casual Group were installing so many more jobs than were the other group, depressed the combined average to between 8.2 and 13.3 in the first ten months of the year. Therefore, taking the low month of October as a basis, each job which was installed averaged 3½ outlets less than the average of the previous year.

Obviously, each electrical outlet installed anywhere in the United States has a definite value to the electrical industry as a whole. It now became necessary to scientifically determine in what proportion the various factors of the industry would benefit by an increase in the number of outlets installed per job.

By this analysis it was found that every additional outlet installed means \$20.60 to the industry in a period of five years. This includes revenue to the contractor from installation of wiring devices and fixtures, to the retailer from the sale of appliances, and to the power companies through the sale of current.

While this figure considered individually is not especially significant, when it is multiplied by three or four hundred thousand, which represents the approximate number of jobs being installed each year on the Pacific Coast, the tremendous importance of the individual outlet becomes at once apparent.

The final outcome of this survey was the "Check" Seal Program. While its general purpose was to better the average electrical installation, and to support that part of the industry which was represented by good workmanship, standard materials and fair prices, the specific purpose of the program was to increase the average number of outlets being installed per job. Unquestionably, the rapid decrease in the average number of outlets being installed was due to the evil of awarding contracts solely on the basis of price, and regardless of the completeness of the installation.

Since the value of the individual outlet was known, the direct financial benefit accruing to the various factors of the industry could be definitely determined. Thus, if the general average of the outlets being installed on the Pacific Coast, could in the course of one year be increased by one outlet, it would in the course of five years represent an

increased income to the industry of between \$6,000,000 and \$8,000,000.

Naturally, the only way in which the standards of the electrical installation could be raised either as regards material or a greater number of outlets, was to educate the public to the evil of the low bid system, and the benefits to be derived from an adequate installation.

A plan was therefore devised to establish in the public mind a means by which the electrical consumer could immediately recognize and obtain qualified contracting service and standard ma-

were opposing the progress of the industry.

This analysis produced a number of conclusions that were regarded as basic facts. First, that the American public as a whole considers value of greater importance than price. Second, that while the value and necessity of electricity had been consistently and permanently established, the average householder had no means of determining the relative value of the installation which delivered it or the appliance which it operated. Third, that by showing the public that a difference in the quality



THE EVERYDAY MEANING of the "Check" Seal

HOTPOINT ELECTRIC IRON—Achieves perfect results with least expenditure of energy. The cantilever handle, found only on the Hotpoint Electric Iron, carries the pressure of the arm and wrist on a direct line to the ironing, eliminating the tense grip and bodily strain required in using old style irons. It is equipped with attached heel stand.

THE NEW HOT POINT WAFFLE IRON—The means to delicious waffles, prepared electrically, without smoke or bother—right at the table. Equipped with double aluminum plates baking entire waffle at one time without "flipping." Heating units are enclosed sheath wire type. Convenient handles, hinges, etc., insure ease of operation and cleaning.

SUPER AUTOMATIC HOTPOINT HUGHES—This range has an automatic time and temperature control, eliminating the housewife's close confinement to the kitchen. Equipped with replaceable heating units, either open coil or sheath wire. The oven has two units for broiling and roasting. The Hotpoint-Hughes is electricity's answer to good and easy cooking.

Ask for this Seal

Ask for the "Check" Seal

The electrical appliances shown on this page, together with other standard electrical products, certified by the "Check" seal, are described in our new booklet, "The Electrical How for Householders." You will enjoy this booklet, with its many practical suggestions for the convenient and economical use of electricity in your home. It may be obtained free from any electrical contractor or dealer displaying this seal or by writing to one of our offices.

PACIFIC STATES ELECTRIC COMPANY

SAN FRANCISCO LOS ANGELES OAKLAND PORTLAND SEATTLE SPOKANE

Go to dealers and Electrical contractors who display the "Check" Seal

Through advertisements of this type the Pacific States Electric Company endeavored to give the "Check" Seal tag character

materials. Such an effort carried to its logical conclusion would almost certainly result in a definite change of public opinion toward electrical installations, and a decided swing to the Qualified Contractor and to the better type of construction which he represents.

The development of such a plan required as careful an analysis as did that which disclosed the factors which

of electrical work and appliances existed, and providing a simple means by which this difference could be determined, they could be relied upon to make a favorable choice.

It was believed that an effort based on these conclusions was sound and logical and one which would promote the best interests of the electrical consumer and benefit the entire electrical industry. Upon this hypothesis the orange

and blue "Check" Seal now recognized throughout the Pacific Coast as identifying good workmanship, standard materials and fair prices in respect to electrical work and electrical merchandise was established as the keynote of our program.

In September, 1921, the "Check" Seal program was subjected to a practical test in the Los Angeles territory. This territory was selected because of the fact that during the period of depression which then prevailed building activity was greater there than elsewhere. Consequently, it offered a more extensive field of operation for the electrical contractor. And since a large portion of the buildings erected were of the cheaper class of dwellings it also offered an unusual opportunity for price competition. Therefore, if it were found that the "Check" Seal program could make headway against such unfavorable conditions, it seemed logical to assume that a more widespread application would bring even greater success.

Previous to the first appearance of the advertising, the contractor-dealers of the Los Angeles territory were given the details of the program and all those who were willing to operate under the principles represented by the "Check" Seal were invited to participate. It was then arranged that all of those who agreed to operate in accordance with the "Check" Seal standards display a "Check" Seal in their places of business and the "Check" Seal tags on the Pacific States Electric Company's merchandise which they sold. In order, however, that the value of this identifying mark to the public be rigidly maintained, the right to operate under the "Check" Seal was held revocable by the Pacific States Electric Company.

Large space in the leading newspapers was then used to point out to the public the difference between the methods of the responsible, qualified contractor and his casual competitor. It also explained the greater value to be obtained from the employment of good workmanship and standard materials and presented the "Check" Seal as a means of identification for such contractors and such merchandise.

From the beginning, the "Check" Seal program justified the premise upon which it was established. The initial Los Angeles effort was continually expanded and by March, 1922, full-page newspaper advertisements and extensive field work were promoting its principles in all of the larger Pacific Coast cities.

The 1923 "Check" Seal plans are designed to consolidate and further the progress already achieved.

An extended newspaper schedule will employ twenty-seven leading papers throughout the Pacific Coast territory, with a combined circulation of more than 1,123,000. Each paper will forcefully present the "Check" Seal story in ten separate advertisements, giving a combined circulation for the year of more than 11,000,000 separate copies.

In addition to this will be an outdoor program which will tell the "Check" Seal story upon the billboards of thirty coast cities. Many of these boards will be painted and illuminated and the showings will alternate with the newspapers in keeping the "Check" Seal principles constantly before the public.

Uncle Sam as an Aid to the Electric Lamp Dealer

Sacramento Firm Increases Business 500 Per Cent in Two Months as a Result of Direct-by-Mail Campaign

With the aid of a telephone directory, a multigraphing machine and 2,000 letters, the Haag Electric Washer Shop of Sacramento, Calif., was recently able to increase its business in electric lamps 500 per cent in two months.

What makes the report of even more significance is the fact that prior to the sales campaign, business had been good and the company was reaping a profit from the lamp sales. However, F. H. McGinnis, the manager and proprietor of the store, was not satisfied with the sales that he was making and he planned a campaign to increase the demand for the lamps which his store stocked.

Previous to this time Mr. McGinnis had discovered that business picked up when he advertised his stock. However, he had not tried the direct-by-mail advertising scheme in Sacramento. With a realization of the fact that the average purchaser of electric lamps, who has had no particular attention given to him, will go into the first store he happens to encounter, Mr. McGinnis decided to construct a mailing list which would cover the business section of the city.

To secure this mailing list, a new telephone directory was used. Names of business firms were taken directly from this book and the accuracy of this method of securing names is testified to by the fact that out of 2,000 letters sent out only 1.5 per cent were returned to the store, unclaimed.

Just before the direct-by-mail campaign was started the newspapers carried small advertisements of the Haag Electric Washer Shop describing the line of electric lamps that the firm carried. These advertisements were directed at business firms in the city, as the letters were to be sent to this class of prospective customers. No particular effort to produce sales was made in this set of advertisements, as the store expected the letters to really bring in the sales which were desired.

After the mailing list had been taken from the telephone directory, by a young woman who had been employed for the purpose at \$18 a week, Mr. McGinnis purchased a multigraphing machine on the installment plan. The initial payment on the machine was \$30. The monthly installments were \$15. The machine used by the Haag company, and which is a style that could be used by any electrical dealer wishing to duplicate the campaign, was listed at \$175.

A competent operator for the multigraphing machine was secured for \$18 a week, and after the letter had been prepared, the young woman turned them out at the rate of 400 a day. A good grade of bond paper was used, which had a lithographed heading, upon which the name of the Haag Electric Washer Shop was imprinted.

The letter which was sent out read as follows:

"Whenever an electric lamp 'burns out,' do you have a reliable source of replacement or do you just buy a lamp from a convenient store, regardless of what is offered?

"There is a great difference in electric light bulbs and, without question, the Edison Mazda lamp is unexcelled. Its laboratories are continually striving to bring Edison lamps the nearest to perfection.

"We are representatives in Sacramento for the Edison lamp—we specialize in them. We are going to tell you about new lamps as they appear, so that you will have the opportunity of having the very best at all times.

"The voltage in Sacramento being extra high, all of our lamps are ordered extra high voltages—this makes them last longer—the ordinary lamp is made for 110 to 115 volts and they do not last nearly so long on the high voltage here.

"We want you to ask us questions about lamp troubles—phone and a representative will call to see you.

"Our free delivery serves you quickly and we will appreciate your phoning us the next lamp order, whether one lamp or a hundred. The number is Main 5453.

"Yours very truly,

"HAAG ELECTRIC WASHER SHOP,

"By.....

"N.B.—For those who use quantities, we have a discount schedule which will prove a saving in Mazda lamp purchases."

This letter was enclosed in a good grade of envelope and was accompanied by enclosures from the manufacturer of the lamps. The sealing of the envelopes necessitated sending them by first-class mail but the manager of the firm thought that first-class mail would receive more attention from business firms than would any other class of matter. The extra cost amounted to only \$20 on the \$2,000 letters sent out.

As a direct result of the 2,000 letters which were sent out, the company estimated that during the 60 days following, lamp sales amounted to \$1,000. Thus on an average investment of 3½ cents per letter, the company received a return of 50 cents.

A tabulation of the results obtained from the letters indicated that several of the largest lamp users of the city had not become customers of the store as a result of the first letter. Plans are now under way to send out a "follow-up" letter which will be directed at the large lamp users. These firms which operate electric signs, etc., will be given more personal attention than it was possible to give in the first letter which was directed at all of the business houses of Sacramento.

In reviewing the direct-by-mail campaign, Mr. McGinnis stated that he was entirely satisfied with the returns from the letters in regard to lamp sales. In addition, the publicity which was given to the firm by the letters will undoubtedly react to the benefit of the concern. Purchasers of electrical merchandise who have been led to the store by the sales letters will naturally return there when they wish other kinds of electrical equipment.

Demonstration Shows Utility of Heavy Appliances

Manufacturer, Power Companies and Retailer Cooperate to Show Large Kitchen Owners How to Do It Electrically

The success which has greeted the displays of electrical equipment for the home, has recently led men of the industry to turn their attention to practical demonstrations of the heavy duty electrical appliances. Heretofore, electrical demonstrations have featured the appliances for the home and have been directed at the small user of the electrical devices.

Electrical home exhibits have been common in the West, and in every locality in which these homes have been displayed the electrical business has prospered as a direct result. These installed demonstrating devices have done a great deal to increase the use of electrical appliances in the homes of the West. Actual counts of the number of appliances and convenience outlets in the homes, show that the number has increased approximately 20 per cent in the last two years.

Manufacturers of the heavy duty appliances have realized the value of these educational displays and have proceeded to arrange practical demonstrations of the larger appliances which are suitable for use in hotels, bakeries, restaurants, clubs, hospitals, institutions, and on steamships. The men interested in the sale of these devices decided that the market was ready for the appliances and that to increase the present demand, it was necessary to demonstrate the practicability of the electrical equipment.

San Francisco was the location chosen for the first display of heavy duty electrical equipment suitable for hotel and restaurant use. The manufacturer de-

cided to cooperate with the retailer and power companies, and arranged a display of the most up-to-date equipment in the retailer's store.

In locating the display the retailer's store was chosen because it was the most centrally located and also because the men who had been invited to visit the exhibition were familiar with the store as it handles a great amount of equipment used by the large kitchen operators. The fact that the display rooms given over to the exhibition were not wired for the installation of the heavy duty appliances did not offer any serious objection to the plan. Direct wires from the distributing lines of the two power companies interested in the display were run into the building and were connected to the equipment on display. Service men of the central station companies completed the installation of the equipment furnished by the manufacturer. The ease with which the devices were connected with the power lines proved to be a point which could be pointed out to the guests who had locations not already wired for electrical equipment.

Previous to the date of the display invitations were sent out to managers of hotels, bakeries, restaurants, cafes, hospitals, clubs, and other men who would be interested in the display. All of the larger establishments of central and northern California were included in the invitation lists. In addition to this, a general invitation was presented to the public through the newspapers. No display advertising was used as it was considered unnecessary.

Attendance proved to be all that the men in charge of the exhibit had hoped for and they were particularly gratified with the results obtained from the invitations. Hundreds of operators and executives of establishments conducting large kitchens were present during the days of the exhibition.

The display opened on Nov. 20 and lasted for two weeks. During the time, a competent pastry cook and an expert chef were present to demonstrate to the visitors the advantages of the electrical equipment. Daily, meats were roasted in the large electric ovens, and whole meals were prepared before the guests. The leading features which interested the visitors were the accuracy of control which could be secured with the electrical equipment, and the speed of the range tops and ovens.

Much favorable comment was heard from the guests concerning the ovens, in which the shrinkage of meats was greatly lessened. The elimination of smoke from fuel combustion, the fuel economies, through simple regulation, and the rugged construction of the devices were also demonstrated in a convincing manner.

Throughout the two weeks, hotel type ranges and cooking tops, griddles, toasters, doughnut stoves, waffle bakers, baking ovens, steam tables, water and air heaters, plate warmers, broilers and many other practical devices were connected and operated exactly as they would be in large kitchens. As the men who visited the display were well acquainted with the other types of heating for the cooking devices, it was a fairly simple matter to demonstrate the advantages of the electric equipment. Men who were well versed in the electrical devices were present at all times to answer any questions that the visit-



Part of the electric oven equipment displayed at the heavy appliance exhibition. Note the placards describing the appliances.

ing executives and operators cared to ask.

These men who acted as guides, were aided by signs which were placed on the equipment. Each device was named and the type, wattage, and price were noted on the small placards. It was found that by placing this information in plain sight, the visitors were better able to determine for themselves, in what type and capacity of equipment they were particularly interested. The fact that visitors were better able to remember figures which they saw, than those which they heard, was also demonstrated here.

Previous to the demonstration of heavy duty waffle bakers, cafe and restaurant owners had been experiencing considerable trouble, during the rush hour at noon, keeping up with the demand for waffles. A considerable number of irons was needed to handle the orders when the demand was at its height as the irons heated by gas or oil had heating surfaces on one side only, necessitating the turning of the waffle. This feature cut down the number of patrons that the establishment could handle with a moderate supply of equipment.

During the exhibit, a heavy duty waffle baker was displayed which promises to remove the difficulties experienced by the restaurant and cafe men who serve waffles to their guests. A battery of three irons was shown on which perfectly baked waffles were turned out at the rate of 120 per hour. The demonstration was so successful that many restaurants and cafes of San Francisco, Fresno and other northern California cities, are now being equipped with the electric waffle irons, which bake both sides of the waffle at once. Another feature which appealed to the discrim-



The hotel type cooking top and the range surprised the visitors by the speed with which they cooked the food

inating men, was the fact that the irons could be had with aluminum cooking surfaces, which need no greasing. When no grease is used there is no offensive smoke given off by the iron while the waffle is being baked.

According to reports from the men in charge of the exhibition it was entirely satisfactory. A great deal of goodwill was secured for the electrical devices and the visitors who attended were given information which they could not have received in any other way. Personal contact was secured between the prospective purchasers and the men interested in the sale of the appliances which will lead to greater business in

the future. The practicability of the electrical equipment was shown to the men so clearly that the complete electrification of many of the kitchens and cafes of northern California may be expected in a short time, according to one of the men interested in the display.

The exhibit was conducted on the fifth floor of the Nathan-Dohrmann Building in San Francisco. Direction of the display was handled jointly by the Nathan-Dohrmann Company, the retailer; the Pacific Gas & Electric Company, the Great Western Power Company, central station companies; and the Edison Electrical Appliance Company, the manufacturer.



The electric waffle irons, griddles, toasters, doughnut stoves, and water heaters, proved to be highly interesting to operators of restaurants and cafes

INDUSTRIAL NEWS



Denver Will Be Served by Large Steam-electric Plant

Construction of the largest steam-electric central station generating unit between the Missouri River and the Pacific Coast will be started in the near future by the Denver Gas & Electric Light Company and the Western Light & Power Company of Denver, Colo. The plant which will be constructed four miles south of Boulder, Colo., will also be the largest steam-electric plant ever erected on an artificial body of water.

The general plans call for sufficient units to develop 120,000 hp. with a possible ultimate development of 250,000 hp. The installation to be made at present will entail an expenditure of approximately \$4,000,000. The entire development will cost about \$12,000,000.

The plant will supply the cities of Denver, Boulder, Fort Collins, Greeley and numerous smaller towns in northwestern Colorado. It is the purpose of the two companies, to be prepared for the electrification of the Moffat Tunnel project.

Boulder Lake, upon which the plant will be erected, now has a storage capacity of 128 acres and impounds approximately 78,000,000 cu. ft. of water. A dam will be erected to increase this capacity to 280,000,000 cu. ft. All coal used by the plant will be stored under water in the lake. A 50,000-ton supply of coal will be stored in this way.

It is the plan of the construction engineers to install steam generating equipment which will be able to use the powdered low grade coal from the mines within a radius of twenty miles of the plant. This will cut down the operating expenses of the plant and will also provide a good market for the low grade coal which has hitherto been of very little use.

New Line Extension Rules Made in State of Washington

A recent order issued by the Department of Public Works at Olympia, Wash., prescribed uniform regulations governing the construction of all line extensions by privately owned electric utilities in the state. Following an objection by the City of Spokane to the Washington Water Power Company charging consumers for extensions, the ruling was issued, conforming with the city's and company's ideas on the matter. The new rules are said by Hance Cleland, supervisor of utilities, to be the basis of two years' study by engineers and officials of the department. Conferences were held last summer with electric utility representatives, and tentative regulations were discussed at that time.

Under the new policy adopted, the company will be required to furnish each customer on a proposed line extension, one 35-ft. pole, one two-wire span of 150 ft., one two-wire service drop of 50 ft., one 5-ampere meter, and necessary accessories for that amount of construction. If the extension is built on another plan, the company will furnish the cash equivalent of this part of the construction, or \$35.

Another important provision is that, should the actual cost of construction of an extension be less than the estimates made by the company, the applicants will receive a refund, pro rated on the amount each paid.

"These rules may save rate increases in the future, where utilities construct electric line extensions on an unwise, injurious and unprofitable basis," said Mr. Cleland. Such companies in the future will be required to collect a larger amount from applicants for extensions. On the other hand, where utilities have required an excessive payment from applicants for extensions, the charges to these new customers will be reduced. Mr. Cleland estimated that the new rules will require one large electric company to charge prospective customers in the future approximately 75 per cent of the charge made, heretofore under the policy of the company. He said the regulations will also require detailed cost estimates and definite accounting on line extensions.

The companies may depart from the regulations only on the ground that they are giving a greater service to customers than required. A copy of the rules is being sent to all state commissions, as this state is one of the first to attempt regulation of this kind.

Rate Regulations Are Changed by Utah Municipal Plant

Nephi City, Utah, which operates a municipal power plant, has been granted permission by the public utilities commission of Utah to make two amendments to its rules affecting electric service. The first requires a tenant to deposit a sum equal to two months' charge for what service he would require, as a guarantee of the payment of the charges to accrue. This advance does not relieve the person from paying the monthly charge to become due except where he fails to pay the charges at the end of the month, when the deposit might be applied, the service discontinued, and the balance returned to the patron.

The second amendment makes the owner of the property liable for the service charges, unless he gives written notice to the city lineman of his intention to lease or rent his premises, and asks that his liability cease.

Contract Let for High Voltage Insulator Factory

Contract for the first high voltage insulator factory to be erected on the Pacific Coast, has recently been let by the Westinghouse High Voltage Insulator Company to the Ralph McLeran Company of San Francisco. The new factory will be erected at Emeryville, Calif. The Westinghouse High Voltage Insulator Company is a subsidiary of the Westinghouse Electric & Manufacturing Company and has its head office at Derry, Pa.

Although the Pacific Coast produces about 80 per cent of the hydroelectric power developed in the United States, no attempt has been made to manufacture high voltage insulators here, before. The new company will use California oil in its kilns and will also use California clay.

The main building, at Emeryville, will contain four kilns for firing the porcelain ware, with possible extensions to include twelve kilns. The product will be shipped to all points on the Pacific Coast and will serve territory as far east as Salt Lake City, Utah.

Ray P. Jackson will be sent by the Westinghouse Electric & Manufacturing Company, to take over the management of the new plant when completed. Marsden H. Hunt will accompany Mr. Jackson, and will act as plant superintendent.

San Francisco Accepts Bids for Transmission Line Wire

Contract for 177 miles of copper wire to be used in the City of San Francisco's transmission line from the Moccasin Creek power house to Newark substation, was recently let to the Anaconda Copper Mining Company, through the San Francisco jobber, the Pacific States Electric Company.

The contract calls for a 345,000-cir. mil. copper cable with a hemp core, the diameter being $\frac{3}{4}$ in. The 177 miles of cable will weigh 1,700,000 lb. and will cost the city approximately \$317,000.

A bid for the aluminum wire for use in the long spans of the transmission line was made by the Aluminum Company of America. The bid for 1,800,000 lb. of steel reinforced aluminum cable was 21½ cents a pound.

The Moccasin Creek power house is a part of the Hetch Hetchy project now under construction. The entire transmission system will cost in the neighborhood of \$5,000,000, according to estimates of the San Francisco city engineer's office. Construction will start within a few months. Bids for the erection of the transmission system have not been called for yet.

Cowlitz River Bridge Crashes Under Heavy Load

Old Wooden Structure in Washington Collapses Throwing Many Automobiles and Pedestrians into River

For reasons not fully determined by engineers, the Cowlitz River bridge, spanning the Cowlitz River in the town of Kelso, southwestern Washington, collapsed recently bringing death to not less than 30 persons.

The bridge was a timber suspension structure with timber stiffening trusses, on pier pilings, featuring a bascule span at one tower support furnishing a 60-ft. opening. This span was operated by cable lift and counterweights.

The bridge was built in 1905 by the Cowlitz Bridge Company, of Kelso, for Cowlitz County. In 1915, it was repaired with replacements of timber portions which had deteriorated.

At the present time, work is progressing rapidly on a 500-ft. steel bridge having a Waddell vertical lift for the channel span. Had it not been for delay in delivering steel for the lift portion, the new bridge would have, undoubtedly, been ready for traffic at the time of the disaster. The balance of the structure, consisting of three approach spans, has been completed for some weeks.

The new bridge is being built by the Pacific Bridge Company, of Portland, and the Gerrick & Gerrick Company, of Seattle. The former named firm has the general contract and the latter the steel erection award.

Explaining the overload on the collapsed structure at the time of the accident, it is stated the bascule had been raised for some time to permit river

traffic to proceed. During this period, numerous cars lined the roadway leading to the approaches on either side and, when the bascule was lowered, moved on, despite the warning sign, placed by the county, insisting that cars space themselves not less than 50 ft. apart. About 15 cars, the exact number is not known, were lost.

Several engineers, authorities on bridge construction, unofficially state the collapse was probably caused by the breaking of a main suspension cable, near the tower, due to overload or deterioration, or both. Or again, that the stripping of an anchorage turnbuckle may have been the cause.

Permission Given for Erection of Two Power Houses

The California Railroad Commission has given the San Gorgonia Power Company permission to build two power houses in the San Bernardino Mountains near Banning, Calif. The Southern Sierras Power Company will take all of the electrical energy generated by the San Gorgonia company.

The water for the two hydroelectric plants will be diverted from irrigation ditches and after passing through the power houses will be returned to the ditches so that it may be used for irrigation purposes. The power generated will be sent over the Southern Sierras Power Company lines to the Coachella and Imperial Valleys.



A portion of the collapsed bridge across the Cowlitz River, may be seen between the sections of the new steel structure under construction

At the last session of the British Columbia legislature, which ended just before Christmas, an act was passed to provide for the inspection and regulation of premises and equipment for the generation, transmission, supply, or use of electric energy. It is understood that the Provincial Government purposes to appoint several inspectors, to look after the electrical equipment in the different parts of the Province.

The Port of Portland is negotiating with the Shipping Board for the purchase of two Diesel engines to be used in equipping a new river dredge. The plan is to make it a Diesel-electric one of about 2,000-hp. capacity with cedar hull.

Application for a permit to appropriate the water of the Nasel River in Pacific County for the purpose of light and power for the cities of South Bend, Ilwaco, Chinook, etc., has been made by the Nettleton Power Company of South Bend, Wash. The purpose is to develop 10,000 hp. and to supply the cities with light and power. A dam 125 ft. long and 50 ft. in height will be constructed. The cost will be about \$250,000.

The new steam-electric plant which is being built in Craig, Colo., by the Hendrie & Bolthoff Electrical Supply Company of Denver, is rapidly nearing completion. The plant when completed will supply electric power for the Colorado town.

Service Resumed by California Company After Fire

Approximately seven and one-half days after the fire, which caused damage to the amount of \$50,000 to the Eagle Rock switching station of the Southern California Edison Company, all impediments to the distribution of power were removed and the system was on a physically normal basis. Men of the Edison company's engineering and repair departments worked day and night to put the system into service again.

While the Eagle Rock station was incapacitated the company secured power from its steam plants at Long Beach and Redondo, Calif., and from interconnections with the San Diego Consolidated Gas & Electric Company and the Southern Sierras Power Company.

The Eagle Rock station is the terminus of the Big Creek transmission line and the station receives a total of 175,000 hp. from this and other sources. Power is received at 150,000 volts and is stepped down for distribution purposes. When the explosion of the lightning arrester occurred, a short circuit was established between the high-voltage wiring of the station and the fire resulted.

In bringing the Big Creek power back on the line, the arrangement of the transformers there was taken advantage of by the company's engineers. The installation at the first power house there is such that the transmission voltage may be stepped-down to 60,000 volts. This was done at the power plant and the power was sent to Los Angeles at 60,000 volts. Thus the Eagle Rock station was cut out of the circuit and the Big Creek plant was tied into the 60,000-volt distribution circuit directly.

Utah City Plans Development of Hydroelectric Power

Parowan City, Utah, plans to construct a municipal power plant to furnish electric energy to citizens and residents in the vicinity. An application has been filed with the state engineer for permission to divert 24 sec.-ft. of water from Center Creek in Iron County for developing a total of 600 hp.

It is proposed under the application to divert the water at a point about about three and one-half miles southeast of Parowan and from there to convey the water by means of an iron or wooden pipe about 28 in. in diameter a distance of 9,650 ft. northwest to the power house site at the base of the Parowan mountain range where it will be used under a head of 300 ft. to operate a single Pelton water wheel of 6-ft. diameter.

City of Pasadena Plans to Erect Step-up Substation

The City of Pasadena has brought condemnation proceedings against the owners of property adjoining its plant on Glenarm Street in Pasadena, Calif. The city plans to erect cooling towers, and a step-up substation on the property.

The manager of the plant plans to increase the generating capacity of the steam driven units. It is planned to install four new boilers in the plant during the coming summer months, others to be added as needed.

Events in Washington of Interest to Western Men

A Survey of Recent Developments in the Nation's Capital by
Paul Wooton, Special Correspondent of the Journal
of Electricity and Western Industry

There is every reason to believe that each one of the seven states that are parties to the Colorado River compact will ratify that unique peace treaty at the session of their legislatures which are now in session. At the same time it is recognized that it lies within the power of any one of the seven states to delay the ratification of this compact and leave the road open for litigation with the resultant blockade for a generation at least of this great national asset. Ratification of the compact means:

(1) Elimination of litigation thus removing blockade on development of 242,000 square miles, a territory larger than the Republic of France.

(2) Orderly development through irrigation and cultivation of 4,000,000 acres of land, now desert.

(3) Utilization, as economic conditions warrant, of waste waters in generation of over 6,000,000 hp. with resultant saving of diminishing fuel resources.

(4) Construction of dams urgently needed for control of floods annually threatening Imperial and Palo Verde Valleys in California and Yuma project in Arizona,—rich communities assessed at over \$100,000,000 where 75,000 to 100,000 Americans gain their living.

(5) New homes for 3,000,000 American citizens, including ex-service men and women.

(6) New communities which will furnish increased markets for the whole country.

(7) Increased wealth to meet our tax burden.

The compact divides the river system into an upper and lower basin and on natural boundaries and economic lines,—i.e., two basins are separated by a thousand miles of canyon and time in which two basins would normally develop, and crops are different. Allocates in perpetuity 16,000,000 acre-feet or 80 per cent of the total natural flow of 20,000,000 acre-feet of the river, more than sufficient to water all lands now being irrigated and all lands which can be economically developed for forty years to come; provides for appointment of a new commission at the end of forty years and leaves to that commission 4,000,000 acre-feet, or 20 per cent of the total natural flow for second apportionment among states; gives agricultural precedence over power; as the river is practically unnavigable, the compact makes navigation subservient to other uses; and leaves all question of Mexican rights to water up to the Federal State Department, the only organ of the American people having any right to deal therewith.

This compact, which adequately protects the interests of all the states and of the Federal Government, is a historic step in interstate relations as it is the first time that more than two states have availed themselves of the Constitutional privilege of settling their differences by negotiation and compact. It will serve as a precedent in substitution of peaceful medium of negotiation, for that of costly litigation with resultant delays in development. It has set-

tled, after eleven months of intensive and exhaustive study, important questions of conflict covering a whole river system and affecting seven states and the Federal Government, whereas similar disputes between two states relative to small tributaries have taken years when submitted for settlement to the courts.

Flood Control Scheme Presented by Utah State Engineer

Flood control through regulation of the storage capacity in reservoirs on the Sevier River is being proposed by R. E. Caldwell, Utah state engineer. The utilization of the reservoirs in storing spring waters is advocated to prevent the damage done annually through floods along the river system.

The engineer has compiled tables showing that in the past nine years ending with 1921 the annual flow of water into the Piute reservoir was sufficient to fill that reservoir during the months of January, February, March and April in seven of the nine years. The stream measurement data on the stream shows conclusively that the larger flood season comes in May and June. It appears advisable to completely empty the reservoir in January of each year and to gradually build up the storage from the flood waters, thus preventing the river from overflowing its banks at this period.

Mr. Caldwell's plan contemplates the reservoirs on the lower Sevier building up their storage during the first few months of the year and then having the upper reservoirs utilize the waters during the later season.

Erection of Substation Starts Construction Program

The erection of the Laguna-Bell terminal station is to be the first step in the \$375,000,000 construction program of the Southern California Edison Company. The program extends over a period of ten years.

According to George C. Ward, vice-president in charge of construction, the entire construction project, when completed, will develop in the neighborhood of 1,250,000 hp. The power will be distributed to most of the counties in southern California.

The new substation will be located in the Vernon district of Los Angeles and will serve as a distributing center for power brought from the Big Creek developments. The capacity of the plant will be 160,000 hp. It will receive power over a new transmission line which is an extension of the Big Creek transmission line. The connection with the line will be made by a new trunk line, thirty miles in length which will connect with the main trunk line at a switching station back of the Eagle Rock station.

The new substation will be constructed in the near future and will cost approximately \$2,000,000. The station will be of the outdoor type and will have the most modern installation possible.

Many Meetings Held to Discuss "Check" Seal Program

In conjunction with the releasing of its 1923 "Check" Seal advertising program, the Pacific States Electric Company has been holding a series of meetings throughout California, Washington and Oregon. The meetings began with one held in the home office of the Pacific States Electric Company in San Francisco, on the afternoon of Jan. 5 and followed by one in Oakland that evening. Other meetings were held in Los Angeles, Stockton, Modesto, and Merced on Jan. 9; in Fresno, on Jan. 10; in San Diego and Bakersfield, on Jan. 11; in Porterville and Visalia, on Jan. 12; and San Jose and Sacramento on Jan. 18 and 19. One group of men in charge of the meetings then went to the Pacific Northwest and presented the sales meetings at Portland, on Jan. 19; Seattle, Jan. 23; Tacoma, Jan. 24; Bellingham, Jan. 25 and at Everett, on Jan. 26. Two distinct parties conducted the sales meetings thus enabling them to cover territory faster.

The meetings have been well attended by leading electrical contractors, electrical retailers, architects, building contractors, and officials and representatives of the various power companies. They have been given over to a discussion of the different aspects of the "Check" Seal program. The subject matter dealt with is fully covered in an article by D. E. Harris, vice-president and general sales manager of the Pacific States Electric Company, which is printed elsewhere in this edition. Similar meetings will be held in the various towns throughout the Pacific Coast until all of the towns covered by the "Check" Seal advertising program for 1923 have been reached.

Washington Water Power Co. Orders New Equipment

The Washington Water Power Company of Spokane, Wash., has awarded contracts for a new turbine water wheel and General Electric generator having a capacity of 22,500 hp., to be installed at the Long Lake power plant. This will bring the Long Lake plant to its capacity of 90,000 hp., on which scale it was planned when the original construction began in 1911.

The new machines, penstocks, foundation and labor will cost several hundred thousand dollars, the amount not yet determined. Shipment on the new equipment contracts is to be made next summer that the new unit may be ready for the winter load. The machines will be shipped by the Great Northern Railroad to Springdale, Wash., and thence over a logging road to Ford, Wash., from there the machinery will be transported by trucks to Long Lake.

Extensive enlargements of the facilities of the Salt Lake & Utah Railroad Company at the site of the new steel mills between Provo and Springville, Utah, will be made in the very near future. New tracks and sidings will be installed at the steel site to properly take care of increased freight and passenger traffic, which necessarily will come with the beginning of construction work on the blast furnace and coke ovens of the Columbia Steel Corporation. It is expected construction of the steel mill will begin about March 1.

Transmission Line to Project on Kings River Started

Construction on the Kings River project of the San Joaquin Light & Power Corporation started with the clearing of the right-of-way for the transmission line from Piedra, Calif., to the site of the proposed Balch power house at the junction of the north and west forks of the stream. The line under construction will be 22 miles long and will cost in the neighborhood of \$170,000.

Approximately 100 steel towers will be built on the line. Aluminum wire will be used. The line when completed will carry power to the site of the power house to be used to run machinery needed in the erection of the plant, and will later connect the plant with the rest of the San Joaquin system.

The transmission line as now being constructed is for 110,000-volt operation. In the line some of the largest spans in the history of steel tower line building will be made. In one place where the line crosses the river there will be a span of 4,100 ft. A reinforced aluminum cable with a steel core will be used for this span and each circuit will be carried on a separate tower. The Pacific Coast Steel Company is making the towers.

Utah Engineers Will Establish Permanent Headquarters

Establishment of permanent headquarters in some centrally located downtown building, in Salt Lake City, Utah, employment of a full-time paid secretary, installation and maintenance of an engineering library and closer affiliation with civic affairs from an engineering standpoint were among the plans discussed at length and approved at a meeting held recently by the Utah branch of the American Association of Engineers.

The meeting was well attended, among those present being H. T. Plumb, Dr. Joseph F. Merrill and R. K. Brown as representatives of the Engineering council, which includes in its membership all branches of the engineering profession.

"It was the consensus of opinion," said C. J. Ullrich, one of the active members of the association, "that the engineers can, in a big way, do much public service outside of their personal professional service when specifically employed. In addition to the establishment of headquarters, maintaining an engineering library and employing a paid secretary, we expect to open an engineering employment bureau and in numerous other ways render the engineering organizations of the state more coherent and effective."

Increase in Electric Rates Is Granted Municipal Plant

The Fairview municipal power plant, situated at Fairview, Utah, has been authorized by the public utilities commission of Utah to increase its rates for electrical service.

The increases consist of one cent per kw-hr. for residence lighting service, and 10 per cent to the flat rate service. A 10 per cent discount is allowed for prompt payment, whereas no discount has been allowed heretofore.

The case came before the commission on the application of the mayor of

Fairview, and was protested by the patrons of the company.

The officials of the town represented that no depreciation reserve had been set aside to take care of replacements. The utilities commission expressed the view that the plant would now be in much better condition except for this failure to establish a depreciation account to keep the plant in condition to render adequate service.

The commission places the depreciable physical property value of the plant at \$25,000 and on this value sets \$1,979 as the minimum annual amount to be set up as depreciation. Based on the 1921 business the gross revenues are estimated at \$4,440, and gross expenses at \$5,100.66, including the amount specified for depreciation. It is estimated, however, that \$300 will be saved through prompt payment of bills, and the resulting deficit under the new rates will be reduced to \$360.57 a year under the commission's findings.

Seventy-Five Thousandth Meter Installed in Denver

Meter No. 75,000 was recently tested and installed by the Denver Gas & Electric Light Company. C. L. Stannard, vice-president and general manager of the company, completed the tests on the meter and had it installed in his new home.

The first meter installed by the Denver company was put in under the direction of the late William J. Barker. Meter No. 1 was located in the "Arcade," a famous gambling hall and cafe of the early days.

In the forty years that have elapsed since the first meter was tested, 75,000 meters have been handled by the Denver Gas & Electric Light Company.

Ford Plant in Los Angeles Will Be Largest in West

Announcement has recently been made that the largest Ford assembly plant west of Chicago will be situated in Los Angeles within a short time. B. L. Graves, western district supervisor of the company, has announced that plans have been drawn and that bids will soon be called for a two-story addition to the present assembly plant in the southern California city.

The extension will add 90,024 sq. ft. of floor space to the present plant. The dimensions of the addition are to be 132 ft. x 341 ft. This will give the plant a frontage of 340 ft. on the railroad and will permit the unloading of thirteen railroad cars at one time. When the plant is completed 350 more men will be needed to supplement the present crew of 650. Between 240 and 300 cars, will be the daily output of the assembly plant when the addition is completed.

The Northwestern Electric Company of Portland, Ore., recently placed an order with the Westinghouse Company for a 7,500-kw., 80 per cent power factor, turbo-generator to be used at the Lincoln steam plant, thereby doubling its generating capacity. Work is already under way at the plant, making the necessary changes and additions. No additional boilers will be needed. A total expenditure of half a million dollars will be made.

Contract for the new extensions of the Electric Supply Company of Canton, China, has been awarded to the firm of Anderson, Myer & Company, Ltd., of New York. The contract figure is approximately \$700,000.



C. N. Stannard, vice-president and general manager of the Denver Gas & Electric Light Company, testing meter No. 75,000. H. P. Tewksbury, superintendent of central station meter department, standing at left and V. L. Board, general superintendent of the company, at Mr. Stannard's right.

San Joaquin Company to Enlarge Crane Valley Power House

The enlarging of Power House No. 3 of the Crane Valley system of the San Joaquin Light & Power Corporation, and the subsequent widening and relining of the conduit carrying water to the Crane Valley power houses, at a cost of \$219,000, is to begin between Feb. 20 and March 1, according to L. J. Moore, executive engineer. The work will be under the supervision of construction engineer H. K. Fox, with C. P. Rhine in charge of engineering and A. J. Black in charge of construction.

The conduit system, which supplies the Crane Valley power houses, consists of a series of canals, tunnels and flume trestles, covering a distance of 4.22 miles. Storage water from the Crane Valley reservoir enters the conduit system and is delivered into the regulating reservoir of No. 3 power house. Water stored in the Crane Valley reservoir passes into this conduit system and through the turbines of the entire Crane Valley chain of power plants before it is turned into the main channel of the San Joaquin River. It is again diverted for use in the Kerckhoff power house and when it is finally released, has operated the turbines for six plants.

The section of No. 3 conduit to be enlarged begins at the outlet tunnel under the Crane Valley dam, extending 4 miles, to the forebay reservoir at plant No. 3. It contains about one mile of small tunnels, the balance of the conduit being cement-lined earth ditch and steel flume supported on trestles. The entire ditch is not only to be relined with cement, but widened, increasing present capacity of 105 sec.-ft. to 170 sec.-ft.

The plant has a present generating capacity of 2000 hp. from two Allis-Chalmers units. It is connected to the transmission system through three, 350-kw. and three 667-kw. transformers. With the addition of the new 4,000-hp. S. Morgan Smith turbines and the General Electric generator, which will be removed from the old Kern Canyon power house, the generating capacity of the plant will be increased to 6,000 hp.

More floor space will be required and an 18 x 36-ft. addition, constructed of concrete with a corrugated roof, supported on steel girders, in which the new equipment will be installed, will be built onto the old power house. This addition will be built out over part of the reserve No. 3 reservoir. Some of the new equipment has already arrived and will be put in place as rapidly as the work on the power house will permit.

About one-half mile of trestle supporting the steel flume will be replaced and sections of the old conduit relined. These flumes are somewhat novel in construction, being of $\frac{3}{8}$ -in. riveted sheet steel, supported on timber cradles and bolsters, which in turn are carried by standard four-pile trestle bents. Expansion and contraction will be provided for by an unriveted slip joint.

Preliminary Permit Granted to Southern Edison Company

A preliminary permit for a power development of the San Joaquin River, and on the lands of the United States within the Sierra National Forest in

Fresno and Madera Counties, California, has recently been granted to the Southern California Edison Company by the Federal Power Commission of Washington, D. C.

The project involves the construction of a system of reservoirs, conduits and power houses on the middle fork, lower part of the south fork, Jackass and Chiquito Creeks, and about five miles on the main San Joaquin River. When developed it will form a part of the power system on Big Creek and the San Joaquin River. It is estimated that an installed capacity of 250,000 hp. could be placed economically.

San Francisco to Have Combined Radio and Electrical Show

To develop radio business and electrical business in general, the American Radio Exposition Company, of New York, N. Y., is to conduct a combined radio and electrical show in the San Francisco Auditorium, Apr. 3-8, inclusive. A similar exposition was conducted in New York recently and the success of the venture prompted the company to prepare for one on the Pacific Coast.

The exposition has been endorsed by the Pacific Radio Trade Association, the San Francisco Electrical Development League, the California Association of Contractor-Dealers, and the San Francisco Contractor-Dealers' Association. Space at the show will be open to all branches of the electrical industry.

Requests for Power Permits Are Indefinitely Suspended

The applications of the City of Los Angeles and the San Joaquin Light & Power Corporation, for power sites in the mountains of Fresno County, California, have been placed on the indefinitely suspended file by the Federal Power Commission at Washington, D. C. Both applications were for projects on the Kings River.

The action of the commission follows action taken last May when a hearing was held before the division engineer of the Federal Power Commission and the engineer of the division of water rights of the California Department of Engineering. At that time Los Angeles officials admitted that the city was not ready at the time to follow up the filings on the Kings River and would not be for some time to come.

Both projects would come within the territory of the proposed Sequoia Roosevelt National Park, which is being urged by Representative Henry Barbour. Efforts are being made to get the Barbour Bill before Congress at the present session. The American Civic Association has gone on record as favoring the bill.

The Idaho Power Company has applied to the Federal Power Commission at Washington, D. C., for a license to erect a 132,000-volt transmission line from Caldwell, Idaho, to Ontario, Ore.

The Lewis River Light & Power Company of Woodland, Wash., has been acquired by the North Coast Power Company of Portland, Ore. The Woodland plant has received power from the North Coast Power Company for several years.

Books and Bulletins

DIRECT CURRENT MACHINERY

By HAROLD PENDER, PH.D., Director, Department of Electrical Engineering, University of Pennsylvania. 6 x 9 in. 314 pages. 146 figures. \$3. John Wiley & Sons, Inc., New York.

At a time when the design and application of alternating current machinery is receiving so much consideration, it is gratifying to see a new text-book which covers the subject of the earlier application of electricity. Dr. Pender's text-book on the theory and performance of direct current machinery is a very good treatment of this class of equipment without any attempt at a treatise on design.

In the first chapter the author has assumed that the student has a knowledge of the elementary principles of electricity and magnetism, but as a ready means of reference a summary of these principles has been included. This has an advantage in that it combines such material in one chapter in the text and gives the student a rapid review of the basic laws. An objection might be raised to this treatment as compared with the method of presenting the principles when they are applied throughout the text, but any method which assists in the thorough mastery of the fundamentals before beginning the detailed study of the various machines is greatly to be desired.

The greater part of the book is devoted to the performance and application of direct current generators and motors and the outstanding feature is the excellent treatment of commutation and armature reaction. Concerning the chapter on commutation the author states that an "attempt has been made to treat this subject in an understandable, and yet rigorous manner. The nature of the effects produced by the various factors involved, and the conditions which must be established in order to avoid sparking are first shown by considering a simple ideal case. The variation in practice from the assumed ideal conditions, and the practical method of securing satisfactory commutation, are discussed in detail."

In the chapter covering the voltage regulation of generators and the operating characteristics of motors, the author has developed an original and ingenious graphical method of showing the performance of such machines.

The subject of commercial testing of direct current machinery is well treated in one of the longer chapters and a good selection of problems at the end of each chapter, with the excellent illustrations throughout the book, should assist materially in its usefulness as a text in engineering schools and as a reference work for those actively engaged in engineering.

E. R. S.

To provide uninterrupted service to the downtown district of Long Beach, Calif., the Southern California Edison Company is to install a new \$200,000 substation in the district. The substation will be situated in one of the alleys in the business section of the city.

Meetings

Progress of Industry Celebrated by Los Angeles Club

In commemoration of the thirtieth anniversary of the operation of the Redlands Light & Power Company's Mill Creek Station, the first hydroelectric polyphase station in the world for long distance transmission, the Electric Club of Los Angeles held a meeting on Jan. 15, on "Thirty Years of Progress." The speakers on that day were R. H. Ballard, vice-president and general manager, Southern California Edison Company; H. B. Woodill, president Woodill & Hulse Electric Company of Los Angeles, and D. F. McGarry, former president of Los Angeles Realty Board. A. L. Spring, field representative of the California Electrical Co-operative Campaign, presided as chairman.

Mr. Ballard told of the expansion of the hydroelectric development in south-Temple and Seventh Street and that in California and pointed out how this section had grown from the little Mill Creek Station plant to the large number of hydroelectric plants at present in operation. He also told of some of the men who were connected with the industry in bygone days and of the obstacles that had been overcome. Mr. Ballard stated that southern California had been a leader in the hydroelectric field in the installation of long distance transmission lines of high voltages. Comparing the progress of the past thirty years in the section in the electrical field with what may be expected in the next thirty years was also discussed by Mr. Ballard.

Mr. Woodill, who was one of the linemen of the Redlands Light & Power Company thirty years ago, told of the vicissitudes of the electrical business in those days and of the installation of the Mill Creek Station and the first long distance transmission lines in this section. Following this he pointed out how Los Angeles had grown electrically and told of the first electrical wholesaler there, the Hellman Hardware Company and of its "large" and "expansive" facilities—one little room. Mr. Woodill spoke on the subject of the first and largest users of current in those days and of some of the early members of the electrical business, some of them now members of the Electric Club, particular among them being R. H. Manahan now city electrician of Los Angeles, and E. R. Northmore, superintendent of distribution, Los Angeles Gas & Electric Corporation, and of the jobs they held in the early days.

Mr. McGarry pointed out how Los Angeles had grown in the interim, and stated that if it had not been for the development of hydroelectricity that Los Angeles could not today be the city it is. He told of the development of the 'back country' and how this had been made possible through the application of electricity and cheap power for the operation of electric railways, electrically operated pumps for irrigation purposes. Mr. McGarry was firm in his

conviction that the present day prosperity of Los Angeles and southern California could not have been but for the development of hydroelectricity.

Mr. Spring presented some statistics showing the growth of the industry and of Los Angeles and stated that twenty-eight years ago E. R. Northmore had made a survey of Broadway between Temple and Seventh Street and reported there was not sufficient load available to warrant his company installing a pole line to take care of the meager load; yet today Broadway is one of the busiest streets in the country.

Commercial and Wiring Sections of N.E.L.A. Meet in Denver

The mid-winter meetings of the national commercial section and national wiring committee of the N.E.L.A. were held in Denver for the first time Jan. 24-26. Over fifty of the committee and bureau members were present, representing all sections of the country and especially the Pacific Coast and Atlantic seaboard states.

All meetings, with the exception of that of the wiring committee, were held in the offices of the Denver Gas & Electric Light Company, which company provided the entertainment for the visitors along with the Rocky Mountain geographic division of the N.E.L.A.

One of the features of the meeting was the dinner round-up the night of Jan. 25 when over 150 electrical men attended. The speakers of the occasion were Bill Goodwin, Samuel Adams Chase, George Hughes, A. K. Baylor, O. R. Hogue, R. S. Hale, and H. A. Lane. This meeting was sponsored by the Electrical Cooperative League of Denver.

COMING EVENTS

Pacific Division, Electrical Supply Jobbers' Association—

Quarterly Meeting—Del Monte, Calif.
Feb. 7-9, 1923

New Mexico Electrical Association—

Annual Meeting—Albuquerque, N. M.
Feb. 12-13, 1923

American Institute of Electrical Engineers—

Midwinter Convention—New York, N. Y.
Feb. 14-16, 1923

National Electric Light Association—

Annual Convention—New York, N. Y.
June 4-8, 1923

Pacific Coast Electrical Association—

Annual Convention—San Francisco, Calif.
June 19-22, 1923

The mid-winter social meeting of the Portland sections of the A.I.E.E. and N.E.L.A. was very well attended. Each year a special open meeting is held with the ladies in attendance. At the recent meeting, after a lecture by President P. L. Campbell of the University of Oregon on the subject of "The University and Practical Progress in Research," the floor was cleared and a dance was held. Announcement was made that due to illness, President Jewett of the A.I.E.E. would be forced to postpone his visit to the coast.

Electrical Convention to Be Held at Fairmont Hotel

The Fairmont Hotel, on Nob Hill in San Francisco, has been chosen as the meeting place for the annual convention of the Pacific Coast Electrical Association. The meeting will be held June 19-22, inclusive.

Plans are now being made by the men in charge of the convention to make the meeting of value to all members who are in the California city during the convention time. Entertainment and business meetings will be provided for the guests.

Annual Meeting Held by Oregon Hydroelectric League

Franklin T. Griffith, president of the Portland Railway Light & Power Company, was one of the principal speakers at the second annual convention of the Hydroelectric League of Oregon, which was held on Jan. 10 in Portland, Ore. Mr. Griffith spoke on the electrical future of Oregon.

The plans for the development of the Umatilla Rapids and the canalization of the Columbia River were outlined by Joseph T. Neal. Eugene Smith, chairman of the World's Electro-Industrial Exposition Company, gave a brief outline of the plans for the exposition which is to be held in 1927. The annual reports of committees and the election of officers were also taken up by the association members.

A grand ball will be given on Feb. 9, at the Goldberg-Bosley School for Dancing Hall, Sixteenth and Flower Streets, Los Angeles, under the auspices of the Electrical Contractors and Dealers Association of Los Angeles. The ball will be given for all members, and their families, of the electrical industry throughout southern California and it is expected that there will be several hundred couples present.

The annual meeting of the New Mexico Electrical Association will be held at Albuquerque, N. M., on Feb. 12-13. Charles E. Twogood, of Albuquerque, is the secretary of the association.

The quarterly meeting of the Pacific Division of the Electrical Supply Jobbers' Association is to be held at Del Monte, Calif., Feb. 7-9. Problems confronting the supply jobbers will be considered at the meeting.

The name of the Southwestern Electrical & Gas Association has been changed to the Southwestern Public Service Association. The headquarters of the association remain at Dallas, Tex.

Fifteen new electric range installations will be served by a new distribution line which is being installed in the town of Selma by the San Joaquin Light & Power Corporation of Fresno, Calif. The line runs through territory where irrigation by electric pumping plants is necessary. A number of electric pumping installations may be put in during the spring.

Personals

D. W. Morgan, manager of the Las Cruces (N.M.) Electric and Gas Company has interested the Chamber of Commerce in his city in an ornamental street lighting system which already has been given the approval of Mayor A. I. Kelso.

H. A. Tewksbury of the Hendrie and Bolthoff Manufacturing and Supply Company assisted at the electrical home in Greeley, Colo., throughout its display.

J. L. White has been chosen to succeed H. C. Shade as manager of the electric store of the Portland Railway Light & Power Company. Mr. Shade will devote all of his time to the Investment Department, especially charged with the sale of prior preferred stock. Mr. White's experience with the electrical business has been largely in central station work. He was connected with the commercial department of the Portland Railway Light & Power Company from 1907-10 and spent the following eight years with the H. M. Bylesby Company at Albany, Ore., and other points in the Willamette Valley in an executive capacity. For the last four years Mr. White has been out of the electrical business, being employed until recently as the Portland manager of the Morris Plan System of Banking.

W. R. Putnam, vice-president and general manager of the Idaho Power Company and former president of the Northwest Electric Light and Power Association, presided over the highly interesting meetings of the commercial section of the National Electric Light Association which have just been held in Denver. Mr. Putnam is chairman of this group of the national organization. Mr. Putnam is one of the most active



W. R. PUTNAM

western utility executives in the affairs of the national body. Before becoming vice-president and general manager of the Idaho Power Company, he was sales manager and commercial manager for the Utah Power & Light Company. He received his early experience in the electrical industry as manager of the Red Wing Gas & Electric Company, Red Wing, Minn.

A. R. Heywood, of Ogden, chairman of the public utilities commission of Utah, and A. A. Hinkley, state agricultural commissioner, have been elected as delegates from Utah on the permanent transportation committee of the western states transportation organization. The permanent transportation committee to which the two Utah men have been elected, is made up of representatives of similar bureaus from the states of California, Washington, Oregon, Idaho, Arizona, Colorado, Montana and Nevada, which is to take up direct with the Interstate Commerce Commission and the railroads matters affecting transportation in the states mentioned in an attempt to avoid the annual car shortage for shipping perishables.

W. A. Alden has just recently joined the Los Angeles office of the Westinghouse Electric & Manufacturing Company in the Industrial and Commercial Lighting department. Prior to his joining the Westinghouse organization, Mr. Alden was, for a number of years, connected with the San Francisco office of the Benjamin Electric Manufacturing Company.

J. R. Deering, office manager of the Los Angeles office of the Westinghouse Electric & Manufacturing Company, and A. S. Duncan, general storekeeper of finished stock, East Pittsburgh works, are on a trip through Arizona and Texas in the interests of that company.

Carl L. Burgess, formerly of the Merchants National Bank of Los Angeles, has just recently joined the office of the Westinghouse Electric & Manufacturing Company as assistant publicity representative under Carl M. Heintz, publicity representative.

L. A. Blackburn, for the past six years with the Erner Electric Company of Cleveland, Ohio, has joined the sales staff of the Electric Railway & Manufacturers' Supply Company of San Francisco.

F. F. McCammon, of the Denver Gas and Electric Light Company and member of the Denver electrical cooperative league advisory board, has been elected a director of the corporation promoting and financing the Pageant of Progress to be held in Denver in July under the auspices of the leading industrial groups in that city.

Tully Scott, formerly chief justice of the Colorado supreme court has been appointed by Governor Sweet a member of the Colorado Public Utilities Commission of which Grant Halderman, a hold-over member, has been reappointed chairman.

J. F. Dostal, president of the Rocky Mountain division of the N.E.L.A. and manager of the Colorado Springs Light, Heat and Power Company is a member of the federal grand jury now sitting in Denver.

W. P. Southard, manager of the Trinidad (Colo.) Electric Transmission Railway and Gas Company, represented the southern Colorado utility interests at the meeting held in Denver Jan. 8 at which Carl D. Jackson, former prominent utility commissioner, was the speaker.

Clarence T. Ward, office attorney and secretary of the Idaho Power Company and the Boise Valley Traction Company for the past four and a half years, has resigned, and will open offices in Boise for the general practice of law.

Dr. L. F. Fuller has accepted a radio engineering appointment with the General Electric Company at Schenectady, N. Y., and will take up his new duties there as soon as work in California under his direction has been completed. The General Electric Company is devoting special attention to the possibilities of radio in various branches of the electrical industry. These range from



DR. L. E. FULLER

high power stations for transoceanic communication to carrier telephone systems for power companies and include the use of large thermionic tubes for power purposes, radio receiving equipment for the home, and the application of radio principles to power work generally. Dr. Fuller was for seven years with the Federal Telegraph Company and particularly during the war as chief engineer of that company did important development work on the high power magnetic arc transmitters which the U. S. Navy now uses for all transoceanic work. In this capacity he was also charged with executive duties and personally represented the company in negotiations on technical matters with the Navy Department at Washington, D. C. Stations designed and built under his direction are used for transmission over some of the longest distances spanned by radio communication. Notable among these is the link between Pearl Harbor, Hawaii, and Cavite, P. I., about 7,000 miles, and the high power transmitters located at San Diego, Panama, Annapolis, and Bordeaux, France. The last named, which was the last designed and built under Dr. Fuller's direction, has a rated capacity of 1,000 kw. Later, with C. B. Kennedy, he formed a partnership under the name of the Colin B. Kennedy Co., and has had an active part in the development of the line of radio receiving instruments bearing that name. For several years he has done radio consultation work in the East, as well as on the Pacific Coast, and recently was retained by the Great Western Power Company and the Pacific Gas & Electric Company, successively, to develop and install complete radio telephone transmitting and receiving systems, using 200-mile, high voltage power lines as carriers. Dr. Fuller was featured as a "Builder of the West" in the Journal of Electricity and Western Industry for Sept. 1, 1919, and was awarded the Morris Liebmann prize for 1919 by the Institute of Radio Engineers in recognition of his research and development work in radio engineering.

James L. Mahon, who for seven years has held the position of advertising manager of the P. A. Geier Company of Cleveland, was appointed merchandising manager of that company on January first. Prior to his connection with the Geier Company, Mr. Mahon was with the Buckeye Lamp Division, a branch of the National Lamp Works of General Electric Company.

W. W. Trench, assistant secretary of the General Electric Company, has been appointed secretary of the various committees which will administer the Charles A. Coffin Foundation, a fund of \$400,000 which has been created by the board of directors of the General Electric Company, the income from which, approximately \$20,000 a year, is to be employed in making various awards for meritorious service in the electrical field.

C. N. Stannard, vice-president and general manager of the Denver Gas and Electric Light Company, has been elected a director of the Tourists Bureau of the Denver Civic and Commercial association.

G. R. Thompson, formerly salesman with the Electric Appliance Company, of San Francisco, has recently left that company and is now acting as salesman for the Western Electric Company with headquarters in San Francisco.

H. W. Read, formerly of the Electric Corporation, Los Angeles, has recently joined the sales organization of the Illinois Electric Company as city salesman. Prior to Mr. Read's connection with the Electric Corporation he was with the Landers, Frary & Clark organization.

George W. Bixler, newly appointed director of publicity for the Denver Gas & Electric Light Company and the Cities Service Company in Denver, has been elected a director of the advertising bureau of the Denver Civic and Commercial Association. Although a newcomer to the publicity field, Mr. Bixler has for sometime been actively engaged in public relations work for



GEORGE W. BIXLER

his company. He is a native of Illinois and has been connected with the central station in Denver since 1905 when he entered the commercial department. Later he was transferred to the adjustment department. He is a former secretary of the electrical bureau of the civic and commercial association in Denver and an active member of the Doherty Men's Fraternity.

Frank H. Riddle, president of the American Ceramic Society and research engineer for the Jeffery DeWitt Insulator Company, Kenova, W. Va., and the Champion Porcelain Company, Detroit, delivered a highly interesting paper on "Ceramic Development of Porcelain Insulators" before a meeting of the San Francisco section, American Institute of Electrical Engineers, on Jan. 30. At the same meeting, Dr. J. A. Jeffery, president of the Champion Insulator Company, read a paper on "Development of Modern Methods of Firing High Voltage Porcelain." The same papers were read before a meeting of the Los Angeles section of the Institute on Feb. 2.

G. B. M. Medearis has been appointed district manager for the F. A. Clarke & Company (Good Housekeeping Shops, Inc.), at Long Beach, Calif. Before coming to California, Mr. Medearis was sales manager for the Iowa Gas & Electric Company at Washington, Iowa.

Richard Sachse, chief engineer of the California State Railroad Commission, is in Washington, D. C., appearing before the Interstate Commerce Commission in the matter of the unification of the terminal facilities of the Southern Pacific, Santa Fe and Los Angeles & Salt Lake railroads on the Pacific Coast.

Raymond W. Lillie, sales engineer for the Jeffery DeWitt Insulator Company of New York, is a recent Pacific Coast visitor.

T. E. Burger, for thirteen years connected with the Los Angeles and San Francisco offices of the Western Electric Company and more recently a member of the staff of the Society for Electrical Development, has been made sales manager of the company at Boston.

Ralph Wilder, Seattle, and H. G. Gute, San Francisco, divisional sales managers in their respective districts for the Birtman Electric Company, have recently returned from an executive sales conference of the company held at the Edgewater Beach Hotel, Chicago.

W. C. Sterne of the Municipal Properties Company, operators of several Colorado utilities, has named six Wyoming utility executives to the Rocky Mountain Committee on Public Utility Information, of which he is chairman. Those who will represent Wyoming on the committee are H. L. Williams, general manager of the Evanston Electric Light Company, E. P. Bacon, general manager of the Natrona Power Company, F. H. Roberts of the Popo Agie Light & Power Company, J. J. Withrow of the Sheridan County Electric Company, E. C. Van Diest, Western Public Service Company, and Charles A. Semrad, of the Western Light & Power Company.

C. P. Bowie, engineer in charge of the U. S. Bureau of Mines, has returned to San Francisco from an extended eastern trip.

Tom A. Rhodes, formerly of the Western Electric Company's Dallas, Texas, office, is now connected with the Los Angeles office of that company, in the sales department.

R. L. Eltringham, manager California Electrical Cooperative Campaign, San Francisco, has been in Los Angeles recently in the interests of the campaign, and while in the South, Mr. Eltringham delivered an excellent address before the Electrical Contractors and Dealers Association of Los Angeles.

A. N. Kemp, who for the past several years has been vice-president of the Southern California Edison Company, in charge of finance, has been elected senior vice-president of the California Bank of Los Angeles, and assumed his new duties on Feb. 1. Mr. Kemp became associated with the Edison Company upon the merger into that corporation of the Pacific Light and Power



A. N. KEMP

Corporation, having held the position of treasurer and controller of the latter company for several years. His duties with both of these companies, therefore, has been directly in connection with their financing and the sale of their securities, and the splendid record that he has made in this line has attracted wide attention. It was Mr. Kemp who directed the extensive and remarkably successful consumer partnership campaign of the Edison Company which resulted in nearly 50,000 investors becoming stockholders in that corporation. In forming a connection with the California Bank, Mr. Kemp is returning to a field of activity with which he is perfectly familiar by reason of long training and experience previous to becoming identified with public utility corporations, and in the words of President John B. Miller of the Edison Company, "His splendid traits of character and personality are bound to make him one of the leading factors in the California banking field."

V. L. Board, Harry Hughes, F. F. McCammon, all of the Denver Gas and Electric Light Company, George E. Lewis, executive manager of the Rocky Mountain Committee on Public Utility Information, and S. W. Bishop, executive manager of the Electrical Cooperative League, served as the committee in charge of all entertainment and arrangements incident to the national commercial section and wiring committee meetings of the N.E.L.A. in Denver, Jan. 24-26.

F. L. Stone of the power and mining department of the General Electric Company, Schenectady, is in Los Angeles on a business trip.

John W. Hancock, a Denver electra-gist, has been elected to the board of directors of the Kiwanis Club of that city.

John F. Greenawalt, publicity manager of the Mountain States Telephone and Telegraph Company, and R. G. Gentry, commercial manager of the Denver Gas and Electric Light Company, addressed the annual sales convention of the Mine and Smelter Supply company in Denver early in January.

Manufacturer, Dealer and Jobber Activities

The P. E. Chapman Electrical Works, St. Louis, Mo., has recently brought out what it calls the Allatonce Commutator Soldering Machine. The device will solder at one time all the joints of a commutator, a rotor of the long joints of container ends or any other device which requires considerable soldering, and faster than one joint can be soldered by hand. It eliminates the slow tedious soldering iron and instead uses a large volume of melted solder. The machine has an arrangement on which the commutator is placed which at once holds it and protects the shaft and ring insulation.

The Robbins & Myers Company, of Springfield, Ohio, has recently prepared for distribution to members of the electrical trade, its Catalog No. 1203. This booklet describes the design of the new Robbins & Myers line of fans. Illustrations of all fans described are presented in the catalog.

The Aluminum Cable Company of America has received an order for 110 pole miles of aluminum cable steel reinforced, to be used on the City of Seattle's Skagit River project, from the Gorge Creek power house to the municipal substation in the outskirts of the city. The new transmission line will have a capacity of 150,000 volts while the cable will be 477,000 cir. mils in area.

The National Tube Company, of Pittsburgh, Pa., has announced the establishment of an Industrial Fellowship in the Mellon Institute of Industrial Research of the University of Pittsburgh, Pittsburgh, Pa. This Industrial Fellowship is engaged in a systematic study of practical methods for the prevention of corrosion in hot-water supply systems. It is also giving attention to the relative corrosive action upon iron and classification of waters of various chemical composition, with respect to their steel, particularly in the form of pipe lines, boiler-economizers, tubes, etc. The present incumbent of the Industrial Fellowship is Clifford R. Texter, who for the past several years has been carrying out research on the corrosion of iron and steel, where not exposed directly to the atmosphere. Mr. Texter is prepared to correspond with engineers and manufacturers interested in the field to which his Industrial Fellowship relates.

The Art Metal Spinning Works is a new firm which has entered the lighting fixture field in Denver, Colo. The company formerly confined its business to spinning and electro-plating but has now gone into assembling and manufacturing fixtures for direct resale to dealers. Harry Smith is manager of the firm.

The Pittsburg Lamp, Brass & Glass Company may establish representation in Denver, Colo., to handle the Rocky Mountain business of the company.

The Hart & Hageman Manufacturing Company, Hartford, Conn., has placed a new fuse plug of the renewable type upon the market. The body of the plug consists of a fluted porcelain cap, into which a porcelain core is inserted. The

porcelain cap carries the threaded brass member which fits the standard fuse receptacle. The separable porcelain core, which is hexagonal in shape, carries the fusible element and the pointed contact button. Examination of the fusible element may be instantly and easily made by slipping the core from the body-cap, exposing the fusible element to view. Should the fusible element be "blown," it is instantly discernible and a new core, carrying a perfect fusible element, can be inserted.

The Pacific Enterprise Company, of Pasadena, Calif., has been organizing a new electrical business in the southern California city. The company will be in the market for a complete line of electrical appliances and wiring supplies in the near future.

The Pacific States Electric Company has recently published a 20-page booklet intended to be distributed to home owners. The title of the booklet is "The Electrical 'How' for Householders." Electrical equipment for every room of the house is described in the booklet and advice as to use of the equipment is given to the housewife.

The Louis Allis Company, of Milwaukee, Wis., has recently placed on the market the new L-A motor type H.D. which has an entirely new principle of rotor construction. The winding of the rotor consists of an integral sheet of copper, punched and formed by a special mechanical process. This one-piece winding is machine-wrapped around the rotor core, the copper bars being expanded into the core slots by swaging. The single joint which extends through the two end rings, is silver welded, after which the metal at both connections is processed by means of a contracting operation that rehardens the copper at the joint where the heat applied during the welding, softened it.

The Ohio Brass Company, of Mansfield, Ohio, has recently published its catalog concerning its line of Imperial headlights. The catalog is very complete and describes the entire line.

The P. A. Geier Company, of Cleveland, Ohio, has announced that Alexander Mueller, of the firm of Rising & Rising, Los Angeles, is the winner of the first prize of \$500 in the recent Royal Cleaner sales campaign. The Pacific Coast is represented on the roster of winners by a long list, including William C. Critz of San Francisco, who stood third and received \$400, E. B. Mills and H. V. Otter of Portland, James B. Keegan and B. T. Franklin of San Francisco, and J. Morrow of San Diego. Thirty-three cash prizes were given in all, totaling \$5,360. The electric cleaner for Christmas idea was used with marked success in this campaign.

Hubbard & Company, of Pittsburgh and Chicago, has recently placed M. M. Johnson in charge of its Denver, Colo., headquarters. The development of the Rocky Mountain territory for pole line hardware necessitated the establishment of district representation. Mr. Johnson will work under the direction of Earl Wessel, who is the western sales manager, located at Chicago.

The Power Specialty Company, of New York, has recently placed R. B. Nutting, formerly Chicago district manager, in charge of the Rocky Mountain territory. Mr. Nutting's headquarters are at 2324 Fourteenth Street, Boulder, Colo.

The Western Electric Company will move its Anaconda, Mont., office to the building recently vacated by the post office. It is expected that the company will be able to move shortly after the first of the month as remodeling of the building should be completed by then.



THE INTERNATIONAL RACE PROBLEM

Time: Recent Jobbers' Convention. Place: The Race Track at Tia Juana, Mexico. Cast of Characters: From left to right—F. N. Averill, president, Fobes Supply Company, Portland; H. L. Bargion, Montana Electric Company, Butte; R. W. Murphy, San Francisco district manager, Westinghouse Lamp Company.

Murphy: "I have the inside dope straight from Barney Google that 'Sprakplug' is a cinch to win." Bargion: "According to the constitution of the League of Nations which I hold here, 'Moonshine' will not figure today."

Averill (thinking of what the Governor of North Carolina said): "I'm backing 'Old Crow' against the field."

Trade Outlook

San Francisco

After experiencing record Christmas sales, dealers in San Francisco are busy stimulating trade through stock-reducing sales. Business is active and the prospects for the year are very bright. Collections are good and installment and credit houses state that their debits greatly exceed those of last year.

Jobbers report that dealers are settling their accounts rapidly and that there are few delinquents among their customers. Stocks of merchandise are being replaced slowly as conditions warrant. The principal demand seems to be for the better grade of merchandise regardless of the higher price.

The trade commission of the San Francisco Chamber of Commerce, sailed for South American ports on Jan. 25. It is thought that the good relations which will be secured by the men of this party with the business firms of the South American republics will react to the benefit of the entire city. More frequent and regular sailings between San Francisco and the eastern coast of South America have been established and will prove to be a trade aid to the city.

Indications are that the interest rates on San Francisco real estate mortgages will be reduced through the year. Should this happen it will have a very decided effect upon building in the city. That the activity of 1922 would be surpassed if cheaper mortgage interest rates could be secured, is a fact admitted by many men interested in building trades and real estate.

Seattle

Extremely heavy rains in various parts of Oregon and Washington caused serious flood menace, but developed comparatively little damage in Washington. Washington lumber mills and logging camps resumed operations the first week in January, completing the shortest holiday shut-down in many years. A feature of the report for the first two weeks in January was a marked proportionate increase in orders for future rail delivery. Sixty-eight per cent of all sales was made in rail markets. Prospects for the early months of the year in the lumber industry are excellent, and with continued open weather, manufacturers expect to continue steady operation.

Electrical jobbers and dealers report a very satisfactory holiday season, and jobbers enter the new year with stocks in many lines exhausted. Radio material, heating appliances, percolators, waffle irons, (always favorites), were leaders this year. Christmas buying in all lines was unusually heavy in Seattle, and department store owners report a very successful Christmas season. There is an increasing tendency to make the Christmas gift an electrical one, due partly to persistent advertising by numerous local concerns, and also, is believed by the attractive

show windows exhibited by some of the well-equipped houses.

Building construction is proceeding in all lines of new work, including several very important large structures. A number of new apartments are under way, and the residence construction is evident in all parts of the city, creating a satisfactory demand for lamps, schedule material and fixtures.

Portland

The power companies of Oregon, for the most part, are busily planning ways and means for caring for the winter loads of 1923-4. There is already a marked shortage of capacity in certain sections due to the unexpected increase in load. Much new generating equipment and many new lines will be needed.

Prospects for new building construction in Portland during 1923 are most promising. The year just closed topped all former records and the new year is expected to surpass 1922 with a probable increase in the percentage of industrial building.

Reports from 125 lumber mills for the week ended Jan. 13 shows production 16 per cent above normal with business 52 per cent above production and shipments 14 per cent below new business. About 40 per cent of the shipments are moving by water. The annual payroll for the Oregon lumber industry in 1922 was in excess of \$40,000,000.

Headed by the Portland Chamber of Commerce, a fund of \$300,000 is being raised for state development. Special studies will be made to determine the best methods of marketing, land settlement and state publicity.

Salt Lake City

The ready market found for Columbia Steel Corporation bonds, in the amount of \$4,000,000, assures the beginning of construction work on this project at the earliest possible moment. This new steel industry will be a very material factor in stimulating business activity.

Business conditions in the intermountain section are still maintaining their improved trend.

There has been a notable increase in the use of electric power in industry, especially in the mining centers. Production at the Utah Copper Company's property at Bingham, Utah, is being constantly increased, with the favorable copper market existing, and indications are that this company's operations will continue to increase.

Electrical dealers and merchants in general continue to report a fair volume of business for this time of the year.

Due to very mild weather some building operations are in progress, and it is predicted that the coming spring and summer season will see unprecedented activity in the building line.

Denver

Denver's building program continues unabated. Extremely fair weather has held up construction thus far and with new plans and projects announced the record established last year will be equaled, according to architects, building supply houses and others.

A serious fire which completely destroyed the warehouse of one of the large local jobbers has had its effect on the supply of some electrical items since last week. Emergency stocks have been secured and through the cooperation of the other Denver jobbing houses business has been handled as usual. Fortunately, stocks had not been replenished after inventory or otherwise the loss might have exceeded the hundred thousand dollar mark.

Appliances are moving slowly as an aftermath of the holidays. A special campaign is being waged on irons of the standard makes while several dealers have moved considerable non-standard material which has been accumulating for a number of years. Washing machines and vacuum cleaners have been moving better since the national stock show here the middle of January.

The announcement that a twelve million dollar power generating and distribution system would be built near Boulder, Colo., shortly by the Doherty interests has stimulated the industry. Orders have already been placed for part of the generators and boiler equipment. The transmission lines will require large shipments of wire, pole line hardware and transformers early this year as options have been closed on the plant site and construction will be started shortly.

Los Angeles

Building activities for Los Angeles for the new year have made a good start, favored by fine weather. Up to and including Jan. 15, the building permits issued numbered 2,164 with an estimated valuation of \$4,774,327, while for the same period last year, the number of permits was 1,695 with a valuation of \$3,542,511.

Bank clearings for the first fifteen days of January amounted to \$257,156,769.17 which compares with the same period of 1922 with \$196,035,713.74 as an increase of about 30 per cent.

Local jobbers and retailers of electrical supplies continue to report excellent sales in this city and throughout southern California. There has been a slight decrease in the sale of appliances since the Christmas holidays but this has been imperceptible compared with former years. The holiday trade in this regard was the greatest in the history of this section, while the bright outlook in the building trades augurs well for the continued sale of electric wiring devices and supplies. A huge power development is under way for the coming year which will necessitate the expenditure of large sums for power equipment and apparatus and the representatives of manufacturers are genuinely optimistic.

Radio supplies and apparatus, particularly parts, are experiencing large sales and this in a measure is due to the continued success of the powerful distributing stations that have been installed in Los Angeles during the past few months.

Construction News

Buildings (Industrial)

Calif., Palms—The Brogdex Company of California, manufacturers of preservative for fresh fruits, is considering the erection of its main plant at Palms, near Culver City. Riverside had formerly been selected, but will be only one of the branches. The company is capitalized for \$1,000,000. Members of the company are: H. F. Keenan, Walter J. Wallace, H. W. Keller, F. C. Van Dine, D. M. Brogdex, A. L. Schwarz and L. H. Henry.

Calif., Santa Barbara—Shell Oil Company of California will expend about \$1,000,000 for the erection of a distributing plant and four filling stations in the vicinity of Santa Barbara. The distribution plant will be located on a recently purchased tract on Salispuedes near Milpas St. L. T. Kittinger is district manager of the company.

Calif., San Pedro—Motor Ship Service Corporation is planning to erect a terminal building or group of buildings at San Pedro to cost \$750,000. The company, recently incorporated for \$1,000,000, is engaged in carrying fruit and will run between the Pacific and Atlantic coast ports. Special refrigerating machinery will be installed in the proposed building. Maurice Selig of San Francisco is president, Walter S. Wheaton, vice-president, and B. R. Douglas, Los Angeles, commercial agent. A site is being selected now.

Calif., Los Angeles—Hamm & Grant, Ferguson Building, have prepared preliminary plans for a woolen mill to be erected in Los Angeles by Lemuel J. Coburn. The plans provide for a mill building, 150 x 600 ft., and a 2-story office building, 40 x 80 ft.; the site has not been definitely selected.

Calif., Los Angeles—Moran Company, Kerckhoff Building, has the contract to erect a 2-story factory on Towne Ave., near Agatha St., for Los Angeles Brush Company. It will be brick construction, pressed brick facing, plate glass, structural steel, steel sash, composition roofing, metal skylights; \$30,000.

Calif., Los Angeles—Architect Albert C. Martin, 430 Higgins Building, is preparing plans for a 5-story and basement class A warehouse, 100 x 350 ft., to be erected at San Pedro and Commercial Streets for Los Angeles Warehouse Company. The one-story warehouse, for which bids were asked a short time ago, will not be built. Plans for the five-story building will be ready for figures in 90 days. It will be of reinforced concrete construction, steel sash, metal skylights, steel rolling doors, sliding metal doors, 1 passenger and 4 freight elevators, automatic sprinkling system; \$350,000.

Calif., Los Angeles—The Austin Company, 702 Pacific Electric Building, has the contract to erect a second unit of the factory buildings for E. H. Rosenthal on Utah Street north of 7th St. It will be 125 x 120 ft., class C construction, composition roofing, metal skylights, steel sash, cement floor; \$25,000.

Calif., Los Angeles—Architect Albert C. Martin, 430 Higgins Building, has completed plans and is taking general bids with structural steel, electric wiring and plumbing separate, for the erection of a 2-story class C warehouse, on East 7th St., east of Santa Fe Ave., for the Republic Supply Company. Brick, 60 x 300 ft., composition roofing, cement and hardwood floors, steel beams, pressed brick front, steel sash, wire glass; \$60,000.

Calif., Los Angeles—The Austin Company, 702 Pacific Electric Building, has prepared plans and has the contract to erect a 1-story and

part 2-story class C brick automobile building on Jefferson St. near Hill St., for R. B. Lloyd. It will be 123 x 124 ft., the 2-story section extending back 96 ft.; brick walls, rugged brick and cast iron facing, plate glass windows, steel beams, concrete and reinforced concrete floors, composition roofing, steel sash, metal skylights, sprinkler system; \$90,000.

Calif., Santa Rosa—A \$100,000 addition to the National Ice and Cold Storage plant on Sebastopol Avenue is to be constructed, according to Superintendent J. J. Flynn.

Calif., Bakersfield—A new cement plant to cost approximately three million dollars, is to be established in Tehachapi by Henry Cowell Lime & Cement Company, it was brought out by A. M. Frost, a representative of the San Joaquin Light & Power Corporation of Fresno, in a general discussion of the Civic Commercial Association.

Calif., Los Angeles—Architects John Parkinson and Donald Parkinson, 420 Title Insurance Building, have completed plans and are taking bids for erecting an addition to the Ford Assembling plant at East 7th Street and Santa Fe Ave., for Ford Auto Company. The building will be 2-story, 132 x 349 ft., reinforced concrete frame, floors and roof slab, brick filler walls, pressed brick and terra cotta facing, plate glass, steel sash, steel roof trusses, steel rolling doors.

Calif., Anaheim—Frank K. Benchley, Fullerton, is preparing plans for a citrus packing plant to be erected in Anaheim for the Anaheim Valencia Growers' Association, with W. L. Benchley, of Fullerton, as chief owner and manager. The building, which will be on the Santa Fe tracks, will be 90 x 130 ft., and cost \$30,000. Equipment will cost about \$7,000. Work will start at once.

Calif., Los Angeles—Gay Engineering Company, 2650 Santa Fe Ave., Los Angeles, has contract and has broken ground for a concrete ice factory, 59 x 104 ft., at 240 No. San Fernando Road, for Union Ice Company, 660 So. Alameda St., Los Angeles; plans by Architect Myron Hunt, Los Angeles.

Calif., Los Angeles—W. H. Daum, Van Nuys Building, has purchased a tract of 240 acres bounded by Central, Florence, Slanson and South Park Avenues, as an industrial tract. Street improvements to cost \$250,000 will be installed and Mr. Daum states that arrangements have been concluded with fifteen manufacturing companies to erect factories in the tract at a cost of \$5,000,000.

Calif., Los Angeles—Lepper & Laisy, 501 O. T. Johnson Building, have the contract to erect a 2-story brick factory building on Long Beach Ave. Chas. M. Hutchinson, Security Building, architect. It will be 80 x 240 ft.; cost, \$50,000.

Calif., Los Angeles—Associated Builders Company, 818 Chapman Building, has the contract to erect a 1-story brick factory building on Newton Street near Central Ave., for Kwalley Feather Company. It will be 50 x 135 ft., brick walls, pressed brick facing, plate glass, steel beams, comp. roofing, metal skylights, cement floors; \$8,500.

Calif., National City—Western Cotton Products Company has been organized by B. B. McCall, Jr., a cotton man from the south, and has purchased the site of the old Nordof China Products plant at 7th Ave. and 12th St. through J. E. Blackman & Son, real estate firm. Buildings will be erected and \$50,000 cotton machinery purchased and installed.

Calif., Bakersfield—Plans for the expenditure of \$50,000 in improving its plant at Toby, near Mojave, have been announced by the Fremont Salt Company, which has just elected the following directors: H. P. Oldham, J. C. Martin, R. Libby, et al.

Calif., Los Angeles—Clark-Hass Company, 3rd St. and Western Ave., has the contract to erect a 1-story office and warehouse building at 31st and San Pedro Sts. for Tyre Brothers Glass Company. Plans by L. A. Smith, 3rd St. and Western Ave. The building will be 150 x 265 ft., brick walls with pressed brick and plaster facing on both street fronts, frame and galvanized iron on the other two sides, comp. roofing, metal skylights, steel sash, cement floor; \$60,000.

Calif., South San Francisco—The Metal & Thermit Corporation of South San Francisco is planning the erection of a large sheet metal rolling plant, to cost \$2,000,000. The new plant, which will adjoin the present holdings of 12 acres, will cover an area of 14 acres. Work will start at an early date. E. W. Kardos is district manager of the Metal & Thermit Corporation.

Calif., Hollywood—Architect Wm. F. Bowen, 813 Union League Building, has completed plans for an ice storage building at Santa Monica Blvd. and La Brea Ave., Hollywood, for the Home Ice Company. Dimensions, 40 x 78 ft., reinforced concrete and steel construction, stucco exterior, 42 ft. high, reinforced roof construction, maple and concrete floors, cork insulation, cooling tower, high pressure piping, elevator and conveyors, ornamental iron; \$50,000.

Calif., Los Angeles—Davidson Construction Company, 1445 E. 16th St., has been awarded the general contract at about \$268,000 for erecting two class A warehouse and factory buildings on E. 7th St. near Anderson St., for Peck & Hills, wholesale furniture dealers. Albert C. Martin, 430 Higgins Building, is the architect. The buildings have been changed from 3-story to 4-story and basement each; dimensions, 80 x 100 ft. and 125 x 250 ft., respectively; concrete construction, steel sash, metal skylights, steel rolling doors, sprinkler system.

Ore., Bend—A veneer plant costing \$25,000 will be built by an eastern manufacturer whose plant in the East has ceased operating because of lack of timber. His new plant will handle 15,000 ft. daily. Announcement made by L. Antles, of the Bend Commercial Club.

Ore., Portland—The Columbia Cement Company has recently been incorporated under a capitalization of \$2,000,000 and has its headquarters in Portland. One of the largest cement plants west of the Missouri River is to be constructed immediately on the holdings of the company west of Huntington, Ore. Engineers are now on the ground making a survey of the property.

Ore., Astoria—The Astoria Shope Brick Company will begin work on a new industrial activity. The site has been purchased and the company has incorporated for \$250,000. The establishment will turn out 35,000 common brick or 15,000 face brick every eight hours, and at the start they will employ from 25 to 30 people.

Ore., Portland—Plans for a modern confectionery establishment are being prepared by A. E. Doyle, architect, for the Portland Hazelwood Company. The new building will be located at East Broadway and Wheeler Sts., occupying a space of 100 x 100 ft. The cost of the building has been estimated at \$100,000.

Ore., Salem—A farmer warehouse, the estimated cost of which will be \$30,000, is to be erected at the corner of Trade and Liberty Sts. by Paul Traglio of Salem. The building will be of reinforced concrete and will be two stories high, having 7,500 sq. ft. of floor space.

Ore., Medford—The Southern Oregon Bi-Products Company will be the name of a new organization which will build a factory west of

the city limits on the Jacksonville railroad for the evaporation of fruits. Construction work will be rushed to completion to be in readiness for next season's crop.

Wash., Birmingham—Plans for immediate establishment and operation of an overall factory in this city have been completed, the company to be known as the Birmingham Garment Manufacturing Company. The plant of the Manning-Wyman Overall Factory of Butte has been purchased and will be moved to Birmingham, where it will be enlarged and developed. The company has purchased the entire townsite and plans to develop a model city for its employees. The plant will start with 20 machines, which will be rapidly increased.

Wash., Tacoma—Furniture Factory—The Gregory Furniture Manufacturing Company has announced plans for the immediate construction of two new buildings which will greatly increase the size of their present plant and which will be modernly equipped with new machinery. The larger of the new buildings will be a two-story, reinforced concrete structure, 205 x 80 ft. in size; the second building to be reinforced concrete, 40 x 100 ft.

Wyo., Torrington—Construction of a 1,000-ton beet sugar factory which will be in operation next fall will be started shortly by the Goshen Sugar Company. Units will be individual electric drive. Justice George W. Allen of the Colorado Supreme Court is president of the company, which has the backing of the Lincoln Land Company. Carl Clinton of this city is one of the incorporators.

Buildings (Miscellaneous)

Ariz., Phoenix—Offices—Trost & Trost, architects of El Paso, are drawing the plans and bids will be called to be opened about March 1 for the 10 or 12-story office building, to be erected at the southwestern corner of Central and Jefferson Streets by George and Arthur Luhrs. Cost of building estimated at \$750,000.

Ariz., Miami—School—Trost & Trost, El Paso, Tex., are taking bids on a high school building to be erected in Miami, Ariz., and for a grade school to be erected in Buena Vista school district, Ariz. Estimated cost, \$150,000.

Calif., Livermore—Hospital—The United States Veterans' Bureau has rejected all bids tendered for the erection of hospital buildings in Livermore, according to word received from James H. MacLafferty, Congressman. The bids were rejected because they were \$600,000 over the estimate. The bureau will immediately call for new bids, and hopes to have returns on them within the next two weeks.

Calif., San Francisco—Institution—John Reid, Jr., city architect, has been directed by T. A. Reardon, president of the board of public works, to prepare plans and specifications for the new \$2,000,000 Relief Home for which bonds were voted on Nov. 21. Work on the plans will be begun so that preliminary details of the construction may be ready when the funds are available, six months hence.

Calif., Vacaville—School—Trustees of the Vaca Valley Union School District have rejected all bids for the erection of an additional school building. Herndon & Finnigan, Sacramento, were the lowest bidders. It was decided to call an election for the purpose of submitting an additional bond issue of \$24,000.

Calif., Taft—Schools—Bids will be called at once for the construction of a group of six reinforced high school buildings, for the Taft union high school district, Kern County, in accordance with plans prepared by Architect W. H. Weeds, 369 Pine St., San Francisco. The group will include auditorium, gymnasium, science bldg., domestic science bldg., shops, added to present school bldg. Construction will be of reinforced concrete with terra cotta tile roof. The work will be divided into the following propositions: Excavating and concrete struc-

tural iron and steel, terrazzo tile, carpentry work, glass and glazing, lathing and plastering, terra cotta tile roof, venetian blinds, electric wiring, furniture, cafeteria kitchen equipment, sheet metal work, painting, lighting fixtures, composition floors, steel lockers, marble work, masonry work, blackboards, finish hardware, comp. roof, window shades and cork carpets and linoleum, special fixtures, plumbing, heating and ventilating, stage equipment. A deposit of \$20 will be required for the plans and specifications which may be obtained from the architect after Jan. 11.

Calif., Los Angeles—County Museum—The Allied Architects' Association is conducting a competition among its own members to obtain a comprehensive plan for a greater museum to be erected at Exposition Park by Los Angeles County. The first plans were submitted on Jan. 29 for criticism by the members. Further plans will be prepared and the final scheme developed in the same manner that the design for the County Hall of Justice was developed. The complete museum will cost several million dollars and its construction will extend over a period of years. It is planned to erect the first unit of the building this year from funds which are now available.

Calif., Ventura—Lodge—Architect Alfred F. Priest, 719 Fay Bldg., is preparing plans for a new store and lodge bldg. to be erected at Ventura for Ventura Elks' Lodge. The first story will contain 4 stores; banquet room on the mezzanine floor; lodge rooms, social rooms, ladies' parlor, lounge and billiard rooms in the second story, and 16 dormitory rooms in the third story; 100 x 150 ft., brick construction, pressed brick and terra cotta facing, plate glass, structural steel, etc.; \$120,000.

Calif., Los Angeles—Apartments—Architects Walker & Eisen, 325 Pacific Finance Bldg., are preparing plans for a 4-story and basement class C apartment house to be erected at northeast corner of 8th and Catalina Sts., for Chas. Isaacs. It will be 150 x 120 ft. and will contain 120 rooms arranged in suites of 2 and 3 rooms each; \$160,000.

Calif., Modesto—Post Office—Keyless Lock Company of Indianapolis was awarded contract by Modesto Post Office in new bldg. which the association is erecting. It will be 1-story, 60 x 100 ft. The equipment includes furniture, boxes, etc.

Calif., Fullerton—Auditorium—Community Service of Fullerton proposes to erect a community auditorium. Architect Frank Benchley of Fullerton is president of the organization. A recent meeting was held at the city hall to formulate plans for securing the proposed building.

Calif., Alhambra—School—Bids have been called for and received by the board of education of Alhambra City high school district for erecting new auditorium and class room bldg. at Alhambra high school. Hunt & Burns, 701 Laughlin Bldg., architects. Bids will be taken for all work complete in one contract and also for 12 segregated contracts. The bldg. will have a frontage of 300 ft., E-shaped with three wings, the auditorium wing being 170 x 115 ft., and the class room wings each being 62 x 120 ft., 2-story and basement, brick construction, plastered exterior, comp. roofing, pine trimming, maple floors, reinforced concrete stairways and corridor floors; \$350,000.

Calif., San Pedro—Store—Offices—Milwaukee Building Company, 315 Wright & Callender Building, has prepared plans and has a contract at about \$97,000 for erecting a 2-story brick store and office building at northwest corner of 6th and Mesa Streets, San Pedro, for Ethel K. Patterson, 4825 Van Ness Ave. It will be 100 x 125 ft., brick walls, pressed brick and terra cotta facing, plate glass windows, steel beams, comp. roofing, metal skylights, pine trimming, lavatories, etc.

Calif., Los Angeles—Club—Architects Allison & Allison, 1405 Hibernian Building, have been

selected to design the new club building to be erected on Flower Street between 8th and 9th Streets, for the Women's Athletic Club, 400 Junior Orpheum Building. The building will be of class A construction, but the height and other details will not be determined until preliminary plans are prepared.

Calif., Fullerton—Church—Noerenberg & Johnson, 401 Los Angeles Railway Building, have been commissioned to prepare plans for a group of church buildings to be erected at the corner of Pomona and Amerige Aves., Fullerton, for the Methodist Episcopal Church. There will be seven buildings, of masonry construction; cost, \$250,000.

Calif., Santa Ana—Club—Architect Frederick H. Eley, Santa Ana, is preparing plans for a 3-story and basement class A club building to be erected at Church and Sycamore Streets, for the Y. M. C. A. It will be 110 x 120 ft., have concrete foundation, stucco finish exterior, tile roof, O. P. trim, concrete floors, tile mantels, tile showers and gas-steam heating, automatic heater, reinforced steel, metal lath, art stone, waterproofing, sidewalk lights, fire escapes, ornamental iron, boilers, steel sash in basement and gymnasium. Estimated cost, \$175,000. Plans will be ready for bids about Feb. 1.

Calif., Bellflower—Bank—Hotel—Architect W. J. Saunders, 227 Laughlin Building, is preparing plans for a 2-story class A bank and hotel building at Bellflower for F. E. Woodruff. The first floor will contain bank, lobby and 8 rooms; the second, 46 rooms. Brick, 56 x 110 ft., pressed brick front, comp. roofing, cement, O. P. and hardwood floors, gas radiator heating, water heater, plate glass, ornamental iron, concrete vault.

Calif., Inglewood—City Hall—Architects Train and Williams, 226 Western Mutual Life Bldg., have been commissioned to prepare plans for a 2-story class A City Hall building at Inglewood for the city. Brick, pressed brick front, art stone trimming, tile roofing; \$45,000.

Calif., Sacramento—Store—Preliminary plans are being drawn for a wholesale grocery establishment to be erected at Third and R Streets, according to recent announcement made by Mrs. Mary Lindley, of Lindley & Co., pioneer wholesale grocers. Cost of the building, which will contain the most modern equipment, is estimated at \$100,000.

Calif., Huntington Park—Store—Lodge—W. M. Bell, Douglas Building, was low bidder at about \$120,000 for erecting new store and lodge building at Huntington Park for Huntington Park Elks' Lodge. Whipple & MacDonald, Huntington Park, were next low bidders. Both bids were held under advisement until the building committee could determine if low bid was for all work complete. A. H. McCulloch, Delta Building, architect.

Calif., Elk Grove—Hall—The Native Sons' Hall Assn. is considering final plans for the erection of a three-story hall, hotel and business structure, to cost approximately \$50,000. J. C. Peterson, architect.

Calif., Sacramento—School—Preliminary plans have been prepared for a parochial school for St. Francis parish, to cost between \$100,000 and \$125,000, building to start in February. The building will be of reinforced concrete, three stories in height, and is to be erected at the southeast corner of 25th and K Streets.

Calif., Lodi—School—Contract for the construction of additions to the Lodi Union High School has been awarded to Charles Maybrey Company, of Sacramento, on their bid of \$216,324. The additions include an auditorium and a science building, each 125 x 175 ft.

Calif., Placerville—School—A bond election for \$160,000 for the construction of a new high school building will be held on Feb. 3.

Calif., San Bernardino—Store—Offices—Bids are being received by Architect De Witt Mitcham for constructing brick store and office building,

on Fourth St., for J. Dale Gentry, owner. The building will be 150 ft. deep, 2-story, the second set back 60 ft. from front, of brick construction, with terra cotta cornice and trimmings. The first floor will contain Ford and Lincoln agency sales room, with 16 offices on second floor. Estimated cost, \$65,000.

Calif., Los Angeles—Store—Offices—Lange & Bergstrom, Washington Building, will be the contractors for the class A store and office building to be erected on 8th St., extending from Spring St. to Main St., for Central Finance Company. Walker & Eisen, 325 Pacific Finance Bldg., architects. The building will be 13-story and basement, steel frame or reinforced concrete construction; \$450,000.

Calif., Santa Monica—Apartment-Hotel—M. P. Rapp, 224 Santa Monica Blvd., and Guy K. Harrison, formerly of Denver, have purchased property at the corner of Ocean and Montana Avenue from D. A. Hamburger, and are having plans prepared for a 7-story class A apartment-hotel, costing \$500,000, which they will erect on the site. The building which is to be on the Palisades, directly overlooking the ocean, will embody every modern apartment convenience and will have a high-class club on the top floor.

Calif., Hanford—Offices—Architects Ernest J. Kump & Company, Rowell Building, Fresno, are preparing plans for a 2-story business block and office building to be erected on Irwin St., between 8th and 9th Streets, for F. N. Isaac. It will be known as the Wealth Center Building. Estimated cost, \$100,000. The building will contain about 23,500 sq. ft. floor space, and will be of brick construction with plate glass store fronts.

Calif., Los Angeles—Store—Offices—Wm. M. Garland, 749 So. Spring Street, contemplates the erection of a 12-story class A store and office building at northwest corner of 9th and Spring Streets. The site is 60 x 155 ft. An architect has not yet been selected.

Calif., Los Angeles—Apartments—Architects Walker & Eisen, 325 Pacific Finance Building, have prepared plans for an 8-story and basement class A apartment house to be erected at the southwest corner of 6th and Park View Sts., for Lange & Bergstrom, Washington Bldg. It will be 120 x 150 ft. and will contain 250 rooms arranged in suites of two and three rooms each. The cost will be \$600,000. Actual construction work was commenced Jan. 15.

Calif., San Francisco—Depot—The U. S. Marine Corps is planning the construction of a three-story depot on Harrison Street, between Spear and Main, at a cost of \$335,000. Old buildings on the site will be removed about July 1 and it is expected that construction work on the new building will start shortly thereafter. The building will cover 100,000 sq. ft. and will be used as headquarters not only for the department of the Pacific but also all other marine corps activities in San Francisco will be housed in the proposed building. Lieut.-Col. N. G. Burton, quartermaster of the Department of the Pacific, U.S.M.C., has present headquarters at 36 Annie Street.

Calif., Los Angeles—School—Architect Chas. M. Hutchison, Security Building, has completed plans for a new school building to be erected at East 2nd Street school site. It will contain 16 rooms, brick construction, ruffled brick facing, slate roofing, pine trim, reinforced concrete stairways and corridor floors; \$116,000. The board of education will advertise for bids shortly.

Calif., Los Angeles—School—Architects John Parkinson and Donald B. Parkinson, 420 Title Insurance Building, are preparing working drawings for the new Beverly High School to be erected at Melrose and Fairfax Avenues. It will contain 60 rooms and an auditorium to seat 1,800; dimensions, 450 x 320 ft.; brick and reinforced concrete construction, selected common brick facing, cast stone trim, clay tile roofing, pine trim, marble and tile work, rein-

forced concrete floors and stairways; \$600,000.

Calif., Los Angeles—School—Architects Morgan, Walls & Morgan, 1124 Van Nuys Building, are preparing working plans for the new building to be erected at Polytechnic High School site. It will be 3-story and will contain 24 class rooms and an auditorium to seat 2,000; \$340,000.

Calif., Los Angeles—Store—Architects John Parkinson and Donald B. Parkinson, 420 Title Insurance Building, are commencing the preparation of plans for the addition to be erected on Fourth Street for the Broadway Department Store. It will be 80 x 125 ft., 11-story, mezzanine story, basement and sub-basement, steel frame and brick construction, reinforced concrete floors, pressed brick and terra cotta facing, plate glass, 8 passenger elevators, truck elevators, etc. It is also planned to add one or more stories to the present building and to install escalators.

Calif., Long Beach—Hotel-Apartments—Architect Alex Curlett, 518 Merchants National Bank Bldg., 6th and Spring Streets, Los Angeles, has prepared preliminary plans for a \$2,000,000, 12-story, class A, own-your-own hotel and apartment building to be erected on Ocean Avenue between Atlantic Avenue and Lime Way, Long Beach, for the Milton Realty Company, 114 Locust Avenue, Long Beach. The building will be 240 x 100 ft. and will contain 250 apartments and 100 hotel rooms. The company includes Jack Milton, O. C. Hurst, J. C. Wickham and J. E. Pamplin.

Calif., San Francisco—Lodge—Plans for a 13-story club house and home, to be started in the near future by San Francisco Lodge, No. 3, Benevolent and Protective Order of Elks, have been submitted by Architect Fred Meyer. The proposed building and the site will be valued in excess of \$1,000,000, being located on the north line of Post Street, between Powell and Mason Streets.

Calif., Fullerton—Store—Offices—John Simpson, 701 San Antonio Ave., Los Angeles, submitted low bid to C. C. Chapman, Fullerton, at \$172,000, for constructing 5-story, class A reinforced concrete store and office building to be erected in Fullerton.

Calif., San Francisco—Offices—The Spring Valley Water Company is planning the erection of a 7-story office building to house the city departments of the organization, to be erected on Mason Street, between Geary and Post Sts. Willis Polk is architect and builder.

Calif., Los Angeles—Store—Architect John M. Cooper, 321 Marsh-Strong Building, has completed plans and has the contract to erect a 2-story and basement brick store building on Hill St., south of 9th St., for Richards Bros. It will be 50 x 150 ft.; cost, \$50,000.

Calif., Los Angeles—Offices—Milwaukee Building Company, 315 Wright & Callender Building, is preparing plans for a 12-story, class A office building to be erected on Hope St. south of Pico St., for K. B. Norswing of Fullerton. The site adjoins the Lutheran Hospital property and the building will be designed for occupancy by physicians and surgeons. It will be 75 x 175 ft., steel frame construction, brick filler walls, pressed brick and terra cotta facing, reinforced concrete floors, elevators, steam heating, etc. Cost, \$750,000.

Calif., Los Angeles—Stores—Milton G. Cooper Dry Goods Company (Cooper, Coate & Casey), 700 So. Los Angeles St., has purchased a site on 9th St. extending from Los Angeles to Santee Sts., and contemplates the erection of a 12-story, class A mercantile building. The architect has not been selected as yet.

Calif., Bakersfield—Hospital—Wm. G. Reed, 310 Loma Ave., Long Beach, was low bidder at \$474,000 on the general contract for erecting a group of hospital buildings at Bakersfield for Kern County.

Calif., Whittier—Store—Hotel—Doyle Construction Company, Chapman Building, has the contract to finance and erect a 4-story and basement class C store and hotel building at southeast corner of Philadelphia and Washington Sts., Whittier. Cost, \$225,000.

Calif., Long Beach—Store—Apartments—Dr. G. D. Dewey, 1075 American Ave., Long Beach, is reported preparing to erect an \$80,000, 2-story brick store and apartment building with a bungalow court in the rear at 1075 American Ave., Long Beach, for himself. Work to start in February.

Calif., Glendale—School—Bids have been received by trustees of Glendale union high school district for erecting new high school bldgs. at southeast corner of Broadway and Verdugo Road, Glendale. John C. Austin, 1125 Baker-Detwiler Bldg., and G. M. Lindsey, Glendale, associated architects. Bids will be taken separately on the general contract, plumbing, heating, wiring, program clocks, and painting. Cost, \$550,000. The main building will be 2-story, 225 x 350 ft., and will contain administration offices, auditorium and class rooms. The science building will be 2-story, 145 x 70 ft., reinforced concrete construction, plastered exterior, cast stone trimming, tile and comp. roofing, pine trimming, steel roof trusses for auditorium, concrete balcony, plenum and direct steam heating.

Calif., Hemet—School—The \$75,000 bond issue of the Hemet Valley school district carried at the recent election. The money realized will be expended for the completion of a junior high school, remodeling of the high school building, and erection of a high school auditorium and gymnasium.

Calif., Fresno—School—Brown & Stafford, Madera, have been awarded the contract at \$62,097 for constructing concrete and brick auditorium for the Central union high school district, Fresno.

Calif., San Gabriel—City Hall—Architects Walker & Eisen, 325 Pacific Finance Bldg., are preparing plans for a new city hall to be erected at San Gabriel. Bonds in the sum of \$50,000 have been voted. The building will be a 2-story, 50 x 100 ft., with a wing, 40 x 20 ft., and a tower. It will be of brick construction, plaster exterior, clay tile roofing, pine trim, oak floors, etc.

Calif., Los Angeles—School—Architect Parker O. Wright, Central Building, has completed plans for a new school building to be erected at Meridian Street school site. It will be 2-story, containing 15 rooms; brick construction, comp. roofing, pine trim; \$104,000. The board of education will advertise for bids shortly.

Calif., Santa Barbara—Hotel—John M. Williams has the contract and has secured a permit for the erection of the new Carrillo hotel at the southeast corner of Carrillo and Chapala Sts. The building which will be of reinforced concrete construction, 5-story, will cost \$350,000. There will be 180 rooms, 175 baths, lobby, dining room, etc. Architecture will be of modified Spanish style with central light court to the rear. Plans were prepared by Architects Marston & Van Pelt, Pasadena. The hotel has been leased to the El Encanto Hotel Company. It will probably be ready for occupancy in the fall.

Calif., Santa Monica—Apartments—Architects Rnoff & Munson, 1107 Story Building, have completed preliminary plans for a 6-story class A apartment and club building to be erected on Palisades Blvd., Santa Monica; owner withheld temporarily; will contain 140 rooms, divided into 70 apartments with complete clubrooms on 6th floor, lobby and entrance for club and apartments; \$300,000.

Calif., Los Angeles—Cafe—The Martin Decorating Company, 107 No. Western Ave., is preparing plans and has the contract to erect a restaurant and cafe building of Moorish architecture, to be erected at Washington and National Aves., for the Green Mill Catering Com-

pany, Morrie Rauch, president, H. W. Hellman Building; will contain terraced dining room to seat 1,000, lounging and rest rooms, kitchen, large lobby and dance floor, 55 ft. diameter. Frame construction, 1-story and part 2-story, plastered exterior, 80 x 200 ft., maple, tile and marble floors, gas furnace heating system, ventilating system, staff work, metal lath, ornamental iron, lawn sprinkling system; the site covers 8 acres, to be landscaped and lighted; \$200,000.

Calif., La Habra—School—A bond issue of \$55,000 will be voted on at a special election to be held soon in this district. Plans for additional buildings, to be erected on the recently added Espold tract, are being prepared. One of the proposed buildings will be 7 rooms with kindergarten.

Calif., San Bernardino—School—A school bond election for \$140,000 to provide two additional buildings will be held in the city school district in about two weeks. The resolution was unanimously adopted by the board of education.

Calif., Los Angeles—Arthur Hesse, 1117 Hollingsworth Building, has prepared plans and will erect a brick bank, store, and apartment building at 8th Ave. and Washington St., for Alex Taylor; will consist of 4 stores, market, drug store, banking space and 90 rooms, divided into 74 apartments; \$185,000.

Calif., Hollywood—Hospital—Architect Robert H. Orr, 1305 Van Nuys Building, has completed plans and is taking general bids for the erection of a new hospital building at Vermont Avenue near Sunset Blvd., for Hollywood Hospital Assn. Five-story, reinforced concrete construction; main section 192 x 40 ft., with wing 60 x 40 ft., training school, emergency hospital, dining room and culinary department in the first story, executive offices, X-ray department, maternity department, operating rooms, and rooms for 150 beds in upper stories; stucco exterior, tile and composition roofing, solariums, marble and tile work, steam heating, vacuum cleaning, refrigerating system, 2 elevators; \$300,000.

Calif., Anaheim—City Hall—The \$165,000 bond issue for completion of city hall building and improving city park and certain street work, carried at the recent election. The funds will be apportioned as follows: \$100,000 for city park, \$40,000 for completion of city hall, and \$25,000 for resurfacing Lincoln Ave. and paving street intersections in the residence sections.

Calif., Arrowhead—Hotel—Atwood Construction Company, E Street, San Bernardino, and Lake Arrowhead, has been awarded a contract at \$245,000 for erecting a 3-story and basement hotel building at Lake Arrowhead; Swasey-McAfee, 405 Hibernian Building, architect. The front section will be 175 x 45 ft. with two wings each 140 x 32 ft.; frame construction, plaster and half timber exterior, shingle roof, pine trim, oak and pine floors, comp. baths, steam heating. It will contain 85 guest rooms with 90 per cent baths, lobby, parlors, dining rooms, service department.

Calif., Los Angeles—Apartments—Architect Kenneth MacDonald, Jr., San Francisco, is preparing plans for a 12-story class A apartment house to be erected at northeast corner of Wilshire Blvd. and New Hampshire Street for William Crittenden, E. Tropp and A. C. Blumenthal, Loew State Building. It will be 50 x 130 ft., reinforced concrete construction, and will contain 350 rooms. Cost, \$1,000,000.

Calif., Los Angeles—Hotel—Architects Dodd & Richards, 905 Brack Shops Building, are preparing preliminary plans for a 12-story and basement class A hotel building to contain 250 rooms, each with bath, to be erected on property adjoining Hotel Clark on south, for E. P. Clark, proprietor of Clark Hotel.

Calif., Los Angeles—Church—Architect Albert C. Martin, 430 Higgins Building, is preparing plans for the new church to be erected at Adams and Figueroa Streets for St. Vincent's Church. It will be Spanish style and will cost

\$500,000. It will be 50 x 225 ft., brick and reinforced concrete construction, stone facing, tile roofing, interior trim of stone, marble and tile work, staff ornamentation, direct and indirect steam heating, pipe organ. There will also be a tower, 150 ft. high, of reinforced concrete construction with stone facing.

Colo., Denver—Church—Mountjoy & Frewen, local architects, have completed plans for a new Sacred Heart Catholic church to be erected at East 28th and York Sts. Cost estimated at \$200,000.

Colo., Denver—Residence Hall—Construction has started on a \$200,000 residence hall to be erected at Regis College. The plans for the buildings, drawn by H. J. Manning of Denver, call for a 3-story brick and stone structure and will contain 150 private rooms with showers, lounging rooms, porches, billiard rooms, trunk rooms, etc. It is the first unit of the projected buildings for the greater Regis College, for which a fund campaign was conducted last October.

Colo., Boulder—Dormitory—A dormitory to house women students at the University of Colorado, adjacent to the campus, is planned, according to local reports, by a group of business men headed by Dr. O. S. Fowler, one of the regents.

Colo., Denver—Store—Offices—A 2-story building on one of the prominent down-town corners will be started shortly by the Pontius Shoe Co. Architects estimate the cost at \$150,000. Display window lighting will be one of the features of the new building, it is said.

Colo., Denver—City Hall—Construction work on Edgewater's new city hall, to cost approximately \$50,000, will begin at an early date. The building will take the form of a community center building. It was designed by H. W. J. Edbrooke, Denver architect.

Idaho, Boise—C. C. Anderson has filed articles of incorporation with a capital of \$2,500,000, to build a string of 13 stores in Idaho, Oregon and Colorado.

Mont., Butte—Lodge—The contract for the new addition to the Butte Masonic Temple on West Park Street has been awarded to A. Broadland. The addition will be built on the site of the Colonial Hotel, which is now being torn down, the cost to be about \$350,000.

Mont., Butte—Hotel—The new Finlen Hotel, costing about \$750,000 including the furnishings, is to be built by A. Broadland. The contract calls for completion by Jan., 1924.

Mont., Helena—Institution—Four new buildings are to be constructed for the state institution for the feeble minded at Boulder. The contract will amount to about \$200,000 and will be built to afford additional residential quarters. The foundations are now in the process of construction.

N. M., Marcial—School—Architects Trost & Trost, El Paso, Tex., are preparing plans for a \$40,000 high school bldg., to be erected at Marcial. Plans will be ready within 60 days.

Ore., Corvallis—Lodge—Corvallis Elks' Lodge has voted to erect a \$60,000 temple, building operations to start at an early date. A lot has been donated by Julian McFadden and Johnson Porter on Second and Monroe Streets on which to erect the building.

Ore., Eugene—Theater—A new and well equipped theater costing \$75,000 is to be built in Eugene for A. H. McDonald. It will be 50 x 160 ft. and of concrete construction, planned by Orlo R. Hossack.

Ore., Portland—Hotel—A residence hotel is to be erected by Herbert Gordon, for Mrs. E. J. Campbell at 11th and Main Streets. The \$200,000 structure is to have four stories and a basement and it is the intention to make it one of the most modern buildings of its kind in the city. It will occupy a space of 150 x 100 ft.

Ore., Portland—Hotel—A 3-story summer hotel will be erected at Gearhart, work to start immediately, completion by July 1. The hotel will contain 98 rooms. It will be located on a 10-acre tract overlooking the ocean and golf links. Cost is estimated at \$200,000. It will be financed by stockholders of the Gearhart Hotel Company, of which Julius L. Meier is president.

Ore., Portland—Hospital—Plans have been prepared by Sutton & Whitney and excavation work started by Abbott & McCulloch on the new \$260,000 hospital for crippled children, to be erected by the Shriners at the southwest corner of East 82nd Street and Sandy Boulevard. The building will be a fireproof structure, built in three sections.

Ore., Portland—School—A 3-story addition is to be added to the Kenton School, 65 x 70 ft., costing \$68,000. John Almeter is the contractor.

Ore., Portland—Lodge—The New Odd Fellows' Temple contracts have been let to Steele & Davis for \$75,224, brick and terra cotta work complete. The heating has gone to Eugene Ruedy at \$15,224. Further awards are to be made on marble, ornamental iron and interior decorating.

Ore., Portland—Apartments—Plans are being prepared by Carl L. Linde for a \$60,000 apartment house to be erected by F. B. Turner at the southwest corner of Schuyler and E. 17th St. N. The building will contain 17 apartments, each equipped with an electric range and other modern conveniences.

Ore., Portland—Apartments—A frame apartment house to cost \$40,000, planned by L. H. Hoffman, is to be erected at 645 Lovejoy Street.

Ore., Portland—School—The new Holladay school is to be built 360 x 90 ft. with the heating plant housed in a separate building. Architect A. E. Doyle has drawn up the plans, which include 20 class rooms, two stories with ordinary construction with masonry walls, faced with red brick and trimmed with cast stone. The building will cost when completed about \$225,000.

Ore., Portland—Offices—Six additional stories on the north side of the Pittcock Block are to be constructed soon, and have already been signed for a ten-year lease to the O. W. R. & N. and the Union Pacific Railroads. The new addition will provide 90,000 sq. ft. of floor space and will cost approximately \$350,000. A. E. Doyle is the architect.

Ore., Portland—Bank—A four-story addition to the First National Bank Building is to be erected by the Security Savings & Trust Co. at a cost of \$350,000. F. H. Miles, of Portland, is the contractor.

Ore., Portland—Apartments—A modern 160-room apartment house is to be built at East 20th and Hawthorne Ave. This structure will be five stories in height, and will be composed of 2, 3 and 4-room apartments. It will be of the very latest type for up-to-date equipment.

Utah, Ogden—Apartments—The Taylor Building Company has taken out permit for the erection of a \$37,000 apartment house at the corner of 27th Street and Madison Avenue. Stephens Brothers will erect a 36-room apartment house at the corner of 26th Street and Adams Avenue.

Utah, Logan—Lodge—Logan Lodge No. 1453, B. P. O. E., will purchase property at Third West and Center Street and spend \$25,000 for renovating for use as a lodge building.

Utah, Salt Lake City—Lodge—The Elks Lodge has subscribed \$135,000 to complete the new building on South Temple Street.

Utah, Salt Lake City—Offices—Plans are announced by C. A. Quigley for the construction of a 20-story office building in Exchange Place, opposite the Commercial Club Building, to cost \$1,500,000. Pope & Burton, architects; H. W. Baum Co., contractors. The building will be a class A steel structure. The top floor of the building will be utilized for a convention hall, a professional library and a law library. The ground floor will be one large office room, in

which desk room and accommodations will be rented. The remaining floors of the building will be devoted to offices fitted up for use of professional men entirely. The desk space idea on the ground floor is a development of Mr. Quigley's own idea. The ground floor will have a ceiling 21 ft. above the floor, and a mezzanine floor will be arranged in this compartment. Mr. Quigley plans to furnish this space entirely with mahogany office furniture, and to divide it with brass railings. Office service will be supplied to the tenants. A telephone private branch exchange will take all telephone calls of the renters, and stenographic service will be supplied on the hourly basis, on demand.

Wash., Seattle—Hotel—George B. Post & Sons, in charge of construction of Seattle's new community hotel to cost \$2,500,000, have appointed E. F. Manahan to supervise construction. Mr. Manahan recently finished supervision of erection of the New Statler Hotel in St. Louis.

Wash., Everett—Apartments—Rudolf Hartmann announces plans for a \$60,000 apartment house to be constructed in the city. Structure will be of brick veneer, 3 stories high.

Wash., Seattle—Store—Standard Construction Company, on a bid of \$40,000, received the contract for the store and loft building, 60 x 108 ft. in size, 2 stories high, to be built by the Alvin Investment Company.

Wash., Seattle—Apartments—Architect W. E. Dwyer has completed plans for a 3-story apartment house, 72 x 109 ft., containing 18 apartments, to be built for C. A. Swanson.

Wash., Sedro Woolley—School—The Union High School District recently voted bonds in the sum of \$150,000 for the erection of a modern high school. Plans provide for a brick structure, two stories high, containing gymnasium, auditorium, and 24 class rooms. Stephens, Stephens & Brust, architects, Seattle, are preparing plans and will call for bids shortly.

Wash., Bremerton—Hospital—Authority has been given the commandant of the Puget Sound Naval Station here for the expenditure of \$150,000 in remodeling and enlarging the navy yard hospital. The work will be done with Navy Yard labor.

Wash., Aberdeen—Bank—Offices—The Greene Engineering Company has been awarded the contract for the construction of the block for the Aberdeen Savings and Loan Association. The cost of the structure complete will be about \$50,000.

Wash., Seattle—Residences—Myroie & Chapman, contractors, will construct sixty modern homes costing more than \$250,000 in the North University district, during the winter. Structures will contain five, six and seven rooms.

Wash., Seattle—Hotel—Seattle's new community hotel, the Olympic, will be officially started on April 1, when construction work will begin. Tenants will be notified to vacate on that date.

Wash., Seattle—Lodge—Seattle Lodge, B. P. O. E., is planning the erection of a building on property adjoining its present building, to cost approximately \$1,100,000. Preparatory to the new construction the Seattle lodge proposes a competition, limited to Seattle architects, on the plans, rules for which have been drafted by the local chapter of the American Institute of Architects. Substantial prizes will be offered.

Wash., Walla Walla—Dormitory—The general contract for the Whitman College men's dormitory was awarded to O. D. Keen of Walla Walla for \$64,720, subject to slight modification.

Wash., Spokane—Lodge—The Knights of Columbus are to have a new \$250,000 centrally located lodge home, plans for which are already being drawn. Specifications call for every modern club convenience, including a large auditorium, ball room, lodge rooms, gymnasium, swimming pool and other facilities. Edward P. Ryan, grand knight of the local council, is responsible for the announcement.

Wash., Hoquiam—Theater—Plans are being made for a new movie picture theater to seat 1,000 people. The structure will be fireproof in every detail and will cost \$45,000, with an additional \$25,000 for furnishings.

Wash., Spokane—Garage—A reinforced concrete garage, 70 x 90 ft., will be added to the labor temple plans. The temple and garage will cost, exclusive of the ground and excavation already made, \$150,000.

Wash., Tacoma—Hospital—The lowest bid submitted to the U. S. Treasury Department at Washington, D. C., for the construction of the proposed U. S. veterans' neuro-psychiatric hospital to be built at American Lake, near Tacoma, was submitted by the Sound Construction & Engineering Company, Seattle, at \$1,276,264. Bids are under consideration in Washington. The general contract calls for the construction of 28 new fireproof buildings, installation of lighting, sewer, water and heating systems, and considerable street work and walk construction. The bid is substantially lower than any other submitted.

Wash., Everett—Hospital—John Arrington, Seattle, on a bid of \$215,297, submitted low figure for the construction of the proposed Everett General Hospital. Twelve bids were submitted, and are under consideration by the hospital directors and architects, Bebb & Gould. The structure is to be 3 stories high, of fireproof construction, 42 x 208 ft. in size, of brick and stone construction, with accommodations for 72 beds.

Wash., Aberdeen—Bank—Greene Engineering Company received the contract for erection of a building for the Aberdeen Savings & Loan Association, to cost \$50,000.

Wash., Olympia—Hotel—Contract for construction of a 22-room addition to the Mitchell Hotel has been awarded to the West Coast Construction Company, Seattle, at a cost of \$45,000.

Wash., Seattle—Chapel—The Sisters of the Sacred Heart will begin work immediately on the construction of a two-story chapel building in connection with the order's orphanage. The building will be 95 x 40 ft. in size, and will cost \$75,000.

Wash., Wenatchee—Courthouse—The Board of Chelan County Commissioners has received bids for the construction of the proposed new courthouse to be erected in Wenatchee at a cost of \$340,000. Morrison & Simpson, Spokane, architects, prepared the plans.

Wash., Seattle—School—Beezer Bros., architects, have completed plans for a three-story and basement masonry school building to cost \$75,000, to be built by the St. Joseph's Church. The structure will cover a ground area of 115 x 114 ft.

Wash., Seattle—Garage—The Pacific States Construction Company received the contract recently for construction of a one-story and basement fireproof garage building and service station for Frank D. Black, Inc., to cost \$75,000.

Wash., Seattle—Apartments—Contract for the 3-story and basement apartment building to be built by P. A. Tramontin, has been let to Walter & Brady. Structure will be 52 x 108 ft. in size, and will cost \$85,000. Each apartment will be equipped with electric range, and electric elevators will be installed.

Wash., Kelso—Hotel—Members of the Kelso Club are planning the erection of a modern fireproof hotel of 150 rooms, to cost \$300,000.

Wash., Kelso—Court House—Cowlitz County will build a new court house in Kelso, and W. W. Lucius of Portland is to be the architect. The cost is to be between \$120,000 and \$150,000.

Wash., Seattle—Store—Mrs. M. N. Carman, ladies' specialty shop, has leased the Wilkes Theater building for 20 years, and will immediately convert the structure into a modern 5-story commercial building, at a cost of approximately

\$200,000. The Great Northern Construction Company, Seattle, has the contract.

Wash., Seattle—Institution—Hans Pederson, general contractor, recently received the award of contract for erecting the proposed St. Vincent's Home for the Aged in West Seattle. The structure will be 5 stories high, and will cost approximately \$1,000,000.

Wash., Walla Walla—School—Low bid for the construction of the proposed men's dormitory at Whitman College, has been submitted by O. D. Keen of Walla Walla, on a bid of \$64,720, for the general contract alone. All bids have been taken under consideration.

Wash., Seattle—Office—Contract for the 3-story Ford service and sales station to be built by E. F. Sweeney of the Sweeny Investment Company, has been awarded to Sylliason & Sando, general contractors, on a bid of approximately \$85,000.

Wash., Seattle—Church—Plans for the proposed \$60,000 church structure to be erected by the Mt. Baker Park Presbyterian Church, are being prepared by A. H. Albertson, architect, Henry Building. Structure will be of brick and terra cotta, with auditorium seating 400.

Wash., Seattle—Office—Plans for a 15-story and basement fireproof office building to cost \$1,000,000, have been completed by Architect Frank H. Fowler and R. Hamilton Rowe, Smith Building. The proposed building will be for the exclusive use of doctors and dentists in the city and will be built by the Doctors and Dentists Building Company. Contract for construction has been entered into with the Great Northern Construction Company, contingent on the sale of stock to finance the structure.

Wash., Seattle—Apartments—The John Collins Estate plans the immediate erection of a big apartment building to cost \$290,000, at 5th and Cherry Streets. John A. Crenitzer, architect, Leary Building, will prepare plans. Structure will be 6 stories high, 124 x 126 ft. in size, containing 107 two and three-room apartments, electrically equipped throughout.

Wash., Seattle—Garage—The Arena, a combined garage and store structure, is to be enlarged by the addition of three stories, making it a 6-story structure, at a cost of \$100,000. Metropolitan Building Company owns the structure and A. H. Albertson, architect, is preparing plans.

Wash., Spokane—Hospital—A 25-unit hospital to cost approximately \$50,000 will be constructed in the spring by the Evangelical Lutheran Deaconesses and Hospital Association. The architect has not yet been selected.

Wash., Seattle—School—The Des Moines District will construct a new union high school at a cost of \$80,000, which will accommodate 300 pupils.

Wash., Seattle—Hotel—The Corrine-Simpson-Wilson Company plans the immediate erection of an apartment-hotel in the University District at a cost of \$750,000. The building will be 6 stories and basement, 144 x 104 ft. in size, containing 99 apartments of one to five rooms each. General contract has been let to the Puget Sound Bridge & Dredging Company, and work will begin immediately.

Wash., Seattle—Store—The First-Pike Corporation plans the immediate construction of a 2-story and loft building to cost \$70,000. John Graham, architect, prepared the plans and will receive bids.

Wash., Longview—Store—The Long-Bell Lumber Company has awarded to the Westlake Construction Company of St. Louis contract for its proposed 2-story, 120 x 150 ft. store and office building, to cost \$125,000.

Wash., Tacoma—School—A bond issue of \$2,000,000 will be voted on at the next school election for the construction of new school buildings to provide room for the over-crowded school rooms.

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These Advertisements

Keep a record today of the time and thought you give to the kitchen. Show it to your husband, and then—but that would be telling.

**m-m-m
what cooking!**

are only a few of the "teasers" that start a campaign with which you can move a large quantity of Crawford Electric Ranges out of your show-rooms onto your domestic meters; they are not half as interesting here as they are when you see them in their place in "The Crawford Plan."

You want to see that plan—every commercial manager who is after range business (and that's what he is after) owes it to himself to examine every one of the carefully-plotted steps in The Crawford Plan.

If you want to see it, say so to Burton Y. Gibson, the Crawford representative on the Coast, at 680 Folsom Street, San Francisco; or, ask any Western Electric Salesman.

The best way to cut down your cost of living is to use *all* of the food you buy

**-m-m-m
What Cooking!**

10

women in this city are going to win a prize next week. And a whole lot of families are going to eat better than they ever thought they could.

**m-m-m
what cooking!**

Crawford ELECTRIC RANGES

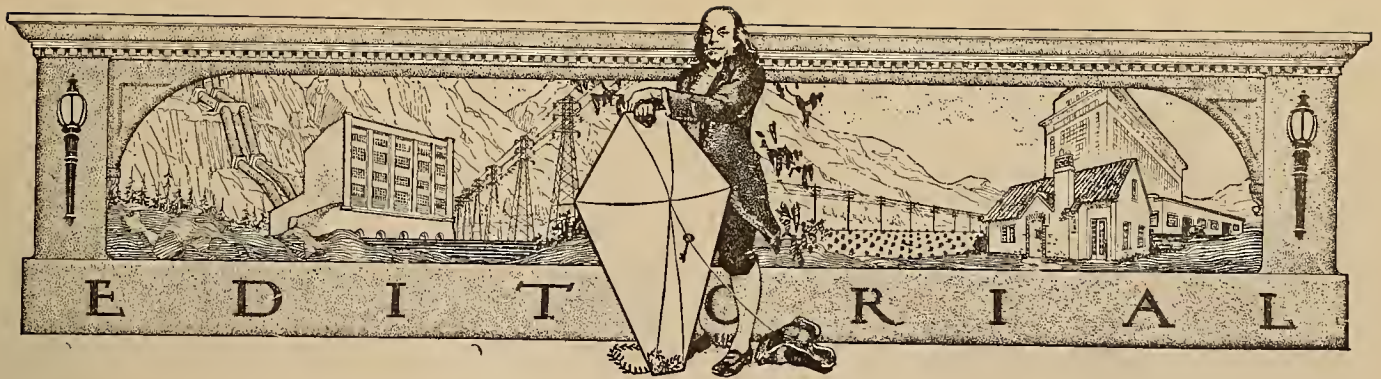
Made by
WALKER & PRATT MFG. CO.
Boston

Distributed by

Western Electric Company
INCORPORATED
Offices in All Principal Cities

He was late to supper, but the food wasn't burnt or cold or anything. Why, this must be Heaven!

— m-m-m!
What cooking!



Pleasing the Public

PUBLIC relations presents a real problem, in fact public relations is in itself so new an idea, that to many it is little more than an expression of a nebulous something or other without which no business or industrial enterprise is complete.

PUBLIC service corporations, banks, industrial organizations, prompt to recognize the advent of a new fashion, have, in the past, set apart a nice office, attached thereto a handsome label, "Department of Public Relations," installed therein a bright young man, and perhaps a stenographer, heaved a sigh of relief, "Thank Heaven, that is done," and gone on about their business.

FEW of them really appreciate the possibilities for creating good-will inferred by that simple combination of two words. Fewer still realize that the practical application of the principles of public relations will prove to be the most potent weapon with which to combat the socialization of our industrial life.

THE success or failure of the public relations idea depends not upon the high officials, nor upon the high-sounding, platitudinous remarks of the after dinner speaker. It is of little or no consequence how many bulletins, orders or regulations are disseminated among utility employees. It is not an idea to be exploited through lofty sentiments from above directed toward the workers in the ranks. It is actually a selling job, requiring a

sales force of the highest type, who will convey by word of mouth and force of example to every man and woman who are contact points between the company which serves, and the consumer who is served, that "The Public Be Pleased" idea is something more than a mere motto on the wall.

IT ISN'T so much what the organization and operation of such a sales force would cost. It is rather what the absence of such a department would cost. While the threat of public ownership will probably be with us always, it is at least a reasonable assumption that if the money spent to defeat the California Water and Power Act had been applied a few years ago to the building up of a structure of good-will between power producer and consumer, not a corporal's guard would have been found to espouse the cause of State ownership.

WITNESS the success of the Standard Oil Company, in very truth, the House of Courtesy. A volume might be written of the many simple, spontaneous acts of politeness on the part of employees to the general public. It is a spirit that pervades the entire organization, from the president down to the lowliest office boy, driller in the field, or white-clad operative in the service station. How is it done? Find out, those of you who aspire for the achievement of practical idealism in public relations, and then apply it to your own business. It pays.

Uniform Classification of Accounts for Electric Public Utilities

"WE ARE surprised to note," says a contemporary, "that the California Railroad Commission has adopted the classification of accounts of the Federal Power Commission instead of that just promulgated by the National Association of Railway and Utilities Commissioners. Knowing the progressiveness of the California Railroad Commission, we cannot feel that it will long retain an obsolete accounting system in place of one that is demonstrably sound and workable."

This is a criticism of the California Railroad Commission for doing the one thing which it was logical and reasonable to do, namely, adopting a classification of accounts similar to the classification adopted by the Federal Power Commission.

This act on the part of the California Commission simplifies the accounting procedure of all California companies thereby reducing unnecessary duplicating of records and attendant costs. Obviously, if the California Commission had adopted the accounting classification of the National Association of Railway and Utility Commissioners, all California companies handling projects under Federal Power Commission permits would be under the necessity of keeping two classifications of accounts. They would have to keep the Federal Power Commission classification and would also have to keep the classification adopted by the California Commission, whereas now they will only have to keep their accounts under one classification.

The statement that the classification adopted by the Federal Power Commission and the California Commission is an obsolete accounting system indicates a lack of knowledge on the part of the author, as the classification adopted by the Federal Power Commission has been under consideration for about a year and a half and three separate drafts of the classification were prepared. During all of this time the representatives of the National Electric Light Association, representatives of individual power companies, of various railroad commissions throughout the United States and representatives of the Accounting Committee of the National Association of Railway Utilities Commissioners have all been consulted and have had the opportunity of presenting criticisms and suggestions. The final classification was adopted only after careful consideration of the suggestions made by all interested parties.

Furthermore, the California Commission has probably had, in the past 10 years, as much experience as any State Commission in the practical application and use of classifications of accounts for electric utilities' properties and particularly for those operating and constructing hydroelectric plants. Under the circumstances it is fair to assume that the California Commission had a very definite idea of what a classification of accounts should be in order that it would give them the information which it is necessary for such a regulating body to have in the performance of its various functions.

Our contemporary also states that the National Association's classification was revised during December to meet the desires of the western companies for a functional set-up of fixed-capital accounts. This may be true, but it is very obvious that such revisions made so recently were not made in time for them to have been given consideration by the California Commission before adopting its new classification. Perhaps if those responsible for the make-up of the National Commissioners' classification had, at an earlier stage of the discussion on accounting classifications, made the changes desired by the western companies, both the Federal Power Commission and the California Commission might have been willing to accept the National Commissioners' classification.

Educate the Home Builder to Demand Quality Installations

A RECENT bulletin to members of a western electrical cooperative association names quality, service, reputation and profit as the chief factors entering into the electrical contracting business, the first three for the protection of the customer; the last for the contractor. The bulletin notes with regret that discretion and sound business sense are being disregarded because of "alarming competitive conditions" injected by the curbstoner and asks, "Why should gross business be increased without a commensurate increase in net profit?"

No business (electrical contracting not specifically excepted) can operate successfully at a loss, or for any length of time without making a fair profit. Yet many contractors have to learn this by bitter experience. Inexperience, poor judgment, and plain ignorance seem to be the major causes for cut-throat competition, which despite drastic attempts to eliminate it, remains a painful thorn in the side of the legitimate contractor.

Aside from attempting to educate the erring contractor in the folly of his ways, more attention should be paid to educating the public to demand not only value received but future satisfaction in housewiring. In an electric installation, just as in the purchase of an automobile or a necktie, a man may get value received for a cheap article, but would be more satisfied had he bought something of better quality. It is generally agreed that the average householder who builds but one home in a lifetime is interested more in value than price. Initial experiments have proven that the public is responsive to such educational work. Both the electrical industry and the public will profit as this education progresses, just as the contracting evil will diminish.

Political Ownership Differs from Public Ownership

POLITICAL fashions change as well as other fashions. The political demagogue of today, to be in style, must favor "public" ownership, so-called. Every new political party thinks it must favor "public" ownership of all public utilities. This has

come to be the plank in their platforms upon which they depend largely in their appeals for membership, the necessary molasses to catch the flies.

The organizers of these parties never tell prospective members that public ownership of utilities would remove \$60,000,000,000 of properties from the tax rolls. All of the plants and properties and all of the securities of railroads, street railways and interurbans, of power and light companies, gas, telephone and telegraph companies, and all other utilities would become exempt from taxation under public ownership.

Who, in that event, will pay the hundreds of millions in taxes now paid by the privately owned utilities of the country? The answer is easy. The few remaining already overburdened taxpayers will carry that additional load.

There is a great difference between political ownership, at expense of the taxpayers, and ownership as stockholders in utilities, which is real public ownership. Customer-stockholders are quick to realize this.

Reorganization of National Radio

Chamber of Commerce Is Effectuated

INTERFERENCE and the broadcasting of trivial and valueless material have injured the radio business in all lines to no small extent. Various attempts at a co-ordination of interests have been made to wipe out the evils of broadcasting and other radio problems with only nominal success.

The commercial importance of radio is of such recent growth and its problems are such, that to be effective, an organization intended to bring about needed reforms must be national in scope. The National Radio Chamber of Commerce, which was formerly composed of manufacturers of radio apparatus, has been recently reorganized to include all organizations or individuals interested in broadcasting. It is to be hoped that this agency will be successful in bringing about the cooperation and improvement in broadcasting activities that is so urgently needed.

Making the Show Windows

Ring the Cash Register

THE wide-awake electrical retailer realizes that this show window is the one place in his store that is valuable above all others. It has truly been said that a good window display is a silent salesman which arrests passing attention, arouses the desire and pulls customers into the store. Show windows can be made to pay the whole rent, and will do so if a little time and attention is devoted to them.

Too often the show windows of retail electrical stores are neglected. The proper wiring of windows for merchants in other lines is a profitable business and if for no other reason, the electrical merchant should demonstrate by his own example the attractiveness and effectiveness of adequate lighting.

In another section of this issue is an account of really remarkable results obtained in the period

of a year from a carefully planned series of window displays. The Field Electrical Company of San Bernardino, California, attributes a monthly gain of twenty-seven per cent in its merchandising business directly to a window display campaign. To the pulling power of these windows is credited the changing of the ratio of the number of people passing the store, compared with the other side of the street, from thirty-two to one, to two and six-tenths to one, in the period of a year.

The direct object of this campaign was to attract customers to an unfavorable location from a retail standpoint. The type of windows displayed by this concern, particularly in lighting effects, would do credit to the highest type of metropolitan establishment. The average electrical merchant can, however, with study and practice, duplicate the results obtained. For after all, the best window display sells the most goods.

Colorado River Treaty Awaits Ratification by One State

LEGISLATURES of six of the seven states affected by the Colorado River Treaty have ratified this important piece of legislation, at the time of this writing. Colorado has so far taken no action, nor has Congress approved the treaty.

Action on the part of the legislature of Colorado has been delayed by the introduction of conflicting bills concerning the general problem of water rights, the apportionment of water and activities on specific projects, as well as the professed desire of members of the legislature to acquaint themselves more fully with the provisions of the treaty.

The interstate pact, which was published in full in the December 15 issue of the Journal of Electricity and Western Industry, must be ratified by all of the signatory states. The principal features of the document are the apportionment of 7,500,000 acre-feet of water annually to each of the upper and lower basins for beneficial consumptive use, and in addition the apportionment of 1,000,000 acre-feet annually to the lower basin with a further apportionment to be made at any time after October 1, 1963. Domestic and agricultural use was decided to be primary, power secondary, and navigation subservient to the other uses.

Congressional action is reported to be delayed by the introduction of the Johnson-Swing Bill which provides for the construction by the United States Reclamation Service of a dam at Boulder Canyon.

The development of the Colorado River for the protection of irrigationists in the lower basin is an urgent necessity. The time is approaching when the water powers of the Colorado will be needed to augment the existing supplies of electrical energy to keep pace with industrial and agricultural growth. No agreement involving affairs of such magnitude as does the Colorado River Treaty can hope to satisfy everyone. No one claims that the treaty is perfect, but it is the best expedient that has been offered after several years of turmoil. In the interests of all parties involved it should be ratified.

CURRENT COMMENT



Ten years' progress in hydroelectric development in Utah, Idaho and western Colorado is described in a comprehensive booklet which has just been issued

Ten Years' Hydro Progress in Utah

by the Utah Power & Light Company in commemoration of its tenth anniversary. The story told by the booklet begins by describing the small, scattered and individually operated power plants that were serving a portion of the company's present territory when the present system was organized. From that point the tremendous progress that has been made in the decade is told in an interesting and instructive manner. Today the system is shown to be a great and unified organization of modern power plants and distribution systems that are serving 205 communities with adequate, dependable and economical electric service. In all, the company's customers today number approximately 85,000.

The Utah Power & Light Company, the booklet tells, has devoted the past ten years to the development of a single resource of the West—water power—and yet in this development it has made possible the development of every other resource of the territory it serves through bringing to commerce and industry the power they require.

The booklet has been prepared for distribution to stockholders, consumers and others and sets a high standard for works of this class. It is gratifying to note the progress which has been made by western utility companies in the dissemination of interesting information relative to their operations, to the people whom they serve and to those who own their securities.

Radio recently played an important part in the resumption of wire communication between cities in the Willamette Valley following a series of disastrous

Radio Reopens Communication After Storm

storms. Floods washed out the tracks of the Southern Pacific Company and the Oregon Electric Company as well as the telephone and telegraph lines of both companies and the local telephone company at Jefferson, eight miles north of Albany. Communication north to Salem and Portland was totally cut off.

In order to use the private telephone line south of Albany, officials of the Oregon Electric Company opened the switch in the Albany office. Meanwhile line crews operating out of Salem repaired the line, but with all other means of communication out and the switch at Albany open there was no means of

advising the Albany office that the repairs had been made.

The Salem officials called upon the Salem Electric Company, which operates broadcasting station KFCD, to broadcast the information that the line was open, with the hope that the message would be



Washout on the lines of the Oregon Electric Company near Salem during recent floods

picked up in Albany. J. H. Ralston, of the Ralston Electric Supply Company of Albany, was listening in and picked up the message. He immediately advised the electric company officials to close the switch at Albany and call Salem. This was done and communication resumed. It was not until 24 hours later that other telephone and telegraph lines were repaired. Radio, in this instance, was of great service, for with bridges washed out and all lines of wire communication down, there was no other means of communication between the cities in question.

An extraordinary accident which cost the life of a lineman is described in a statement recently received from L. Berks, chief electrical engineer, Department of Public Works, Wellington, New Zealand.

Bird in Wires Results in Lineman's Death

The accident, which occurred when a crew was repairing a blown fuse on a distribution line, is described by Mr. Berks as follows: "A 3,000-volt fuse had blown on an 11,000-volt pole transformer station at Te Aroha and the lineman and his mate went out to replace it. The transformer is supplied by means of a throw-over switch from either of two 11,000-volt circuits running across at the top of the pole station. The

throw-over switch has a central dead position with a break of 9 in. from either set of jaws. The lineman unlocked the quadrant and opened the air-break switch, according to the evidence, to a distance of only about 4 in. instead of the full 9-in. break and proceeded to climb from the platform to the 3,000-volt fuses, making contact with the dead 11,000-volt leads. His mate beneath the platform heard a discharge and the lineman fell dead onto the platform.

"On removal of the corpse the dead body of a sparrow was found beneath it quite warm and with the beak and legs burned off. When examined the connections below the throw-over switch were all dead and safe and the deceased had not gone up within several feet of the live leads. Evidently the sparrow was killed simultaneously with the man and the accident was apparently due to the sparrow having made connection across the half opened air break switch, the momentary arc through the sparrow's body being sufficient to cause the death of the lineman."

While the accident resulted on account of the failure on the part of the lineman to observe the regulations regarding the grounding of high tension lines before working on them, the circumstances were most extraordinary and illustrate how dangerous it is to take any liberties whatsoever with high voltages.

The comparative importance of the Asiatic market for American made industrial machinery has expanded about three and a half times during the past

Asiatic Market For Machinery Is Expanding

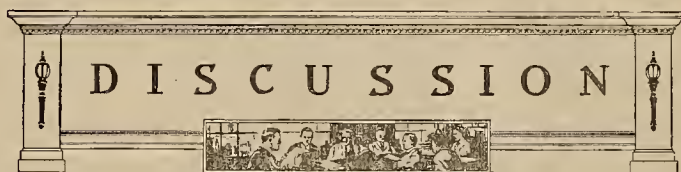
decade, according to W. H. Rastall, chief of the industrial machinery division of the Department of Commerce, in an article in the current issue of Commerce

Reports. The value of American machinery absorbed in Asia has risen from \$3,800,000 in 1910 to \$64,400,000 in 1921.

As contrasted with the markets of Europe, which are contracting, the markets of Asia are showing most satisfactory expansion, and it would appear that constructive sales effort would yield the best returns when applied to expanding markets. Most of the countries of Asia are very densely populated and show indications of being capable of marked industrial development, as contrasted with markets in many other parts of the world in territories that have been developed more recently, where there is a lack of adequate population, even when it is known that the natural resources justify exploitation. South America, Australia, and other sections have their immigration problems, but with Asia it is more a matter of raising the standard of living, and very rapid progress is being made in this direction.

It is a mistake to think of Asia as the "unchanging East." Railways are being developed, shipping increases rapidly from year to year; mines are being opened, industries are being established, highways are being constructed, automobiles and trucks are being placed in service, and in a great many other ways the entire continent is showing signs of ab-

sorbing an ever-increasing volume of mechanical equipment of great variety. In mapping out a sales program for the current year the foreign-sales manager should make ample allowance for these and many other factors.



Qualifications for Railroad Commissioners Explained by Fresno Engineer

To the Editor:

Sir: As the author of the article on the qualifications of railroad commissioners in the "Pacific Engineer" for November, 1922, with which you took issue in a recent editorial and with reference also to the letter of the Public Affairs Committee of the San Francisco Chapter of the American Association of Engineers and your answer in your issue of Jan. 1, may I not be permitted to voice my opinion?

I do not understand how you read into my article that any one was qualified merely because he was an engineer, for this is quite different from saying that no one but an engineer is qualified, and that even is more than I said.

But I wish especially to take issue with your phrase, that a prospective commissioner "should be able to judge." There are some who are good judges of horses and others who are good judges of paintings, but I can imagine no one who is able to judge and I find no meaning in the phrase until you tell me what it is he "should be able to judge." Chief Justice Taft would be eminently qualified where questions of American law are involved, but where a question of the merit of an ordinary surveyor's job is involved an ordinary transitman would be better qualified than the whole supreme court.

I agree with your other qualifications, but would add that the ideal commissioner must be aggressive. He is not a mere judge of questions brought before him, but he is to supervise and control, and to do that he must have initiative. Taft would certainly make a better judge than Roosevelt, but Roosevelt would have made the better commissioner.

I believe there should be two, or perhaps three competent engineers on the railroad commission, and one competent attorney and a business man with a fair knowledge of accounting; I believe such a composition of the commission would be able to inspire confidence in its honesty and in its ability to do justice.

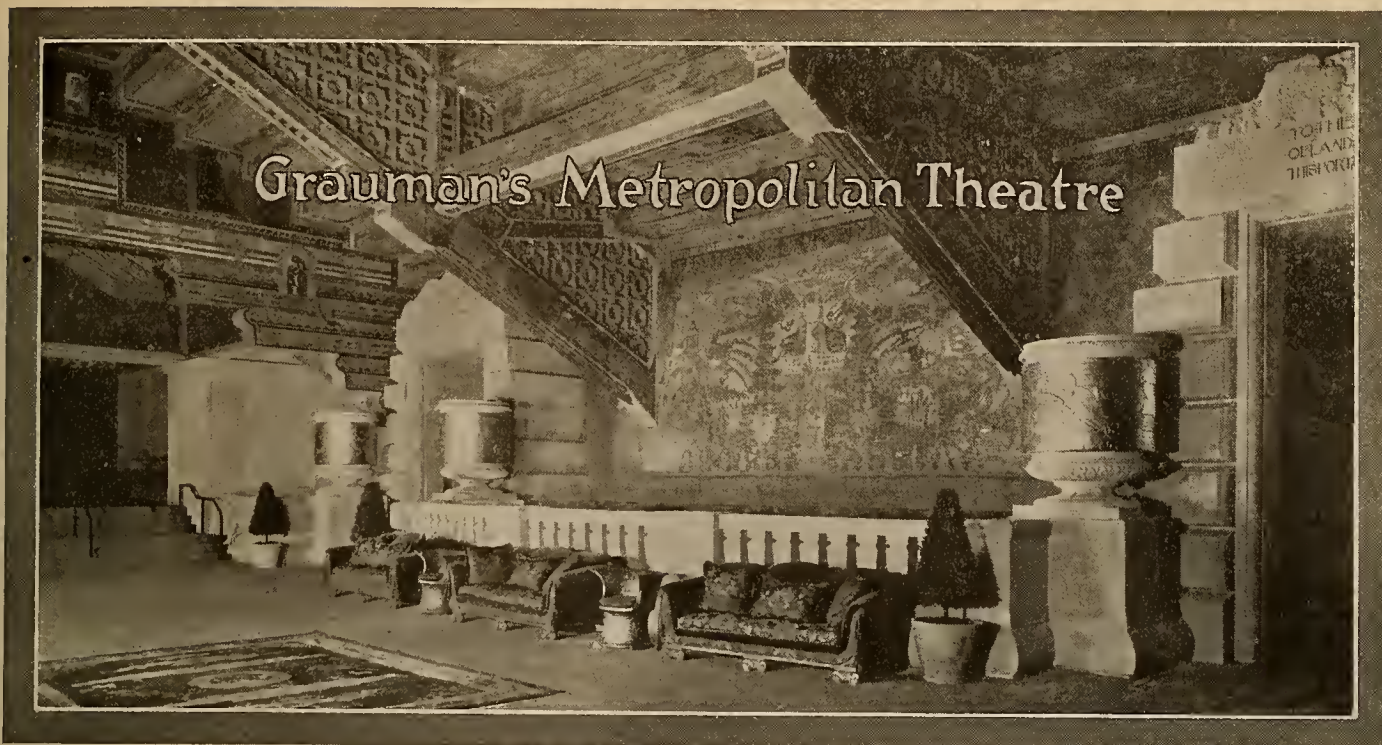
The two or three measures on the last ballot which aimed to extend the control of the railroad commission were defeated and I believe this reflects the lack of confidence which the people of California have or had in the commission as constituted at that time.

B. F. JAKOBSEN,
Hydraulic and Electrical Engineer.

Fresno, Calif.
Jan. 5, 1923.



POWER House No. 3 of the Crane Valley System of the San Joaquin Light and Power Corporation, on the North Fork of the San Joaquin River, 50 miles north of Fresno, California. The enlargement of this plant from 2,000 to 6,000 hp. and the relining and widening of the conduit carrying water to the Crane Valley power houses will begin on March 1.



IF ONE had followed the practice in theater illumination, he would have a fairly comprehensive record of the development of lighting science itself. Theater managers, in their search for the unique and the novel to attract patronage to their houses, have depended upon lighting to such a degree that the playhouse has been an illumination laboratory where new principles have been evolved and new ideas perfected, later to be universally accepted as common practice. Thus the blazing pine knots in iron baskets of the fifteenth century were the forerunners of the intricate systems of color electric lighting of today. The candles which lighted George Washington to his seat in the famous John Street Theater and the flickering gas jets which illumined Lincoln's box at Ford's have been but stages in the development of lighting technique.

The history of the development of theater lighting is highly interesting. It took many years to develop this lighting through the successive periods of open-flame oil lamps, pine knots, candles, oil lamps with glass chimneys, gas lighting, lime lighting and finally electricity. It was not until gas lighting was invented that systems for controlling the lights could be obtained. Since that time, however, great strides have been made, and every generation has brought forth theaters that have eclipsed their predecessors in the brilliance and beauty of their lights.

Into this class falls Grauman's Metropolitan Theatre, recently opened to the public of Los Angeles. Conceded to be the most beautifully lighted

By George C. Tenney

CONCEDED to be the most beautifully lighted theater in the world, this Los Angeles showhouse possesses a system of electric lighting and control unparalleled in the history of theater development. One-eighth of the \$4,000,000 which it cost, was spent on the electrical equipment.

theater in the world, this playhouse possesses a system of electric lighting and control that is unparalleled in the history of theater development. Add to this the additional electrical equipment of the ventilating system, the projecting room, the organ, and the stage and the total connected load of the theater reaches 900,000 watts, equal to that of many large industrial plants.

Grauman's Metropolitan Theatre was constructed at a cost of \$4,000,000 for Sid Grauman, from plans prepared by William Lee Woollett. The consulting engineers were Holmes & Sanborn. This firm designed the lighting equipment, which was installed under their supervision by the Newbery Electric Corporation. The entire cost of the electrical equipment is in excess of \$250,000.

The theater has its own substation in a separate room in the basement. Both alternating current at 2,200 volts and direct current energy is supplied by the Bureau of Power and Light of the City of Los Angeles. Standby alternating current service is furnished by the Los Angeles Gas & Electric Corporation. Automatic throw-over oil switches are so arranged that in case of a shut-down on the city lines the entire load can be picked up with a minimum loss of time by the electric company. Thus the systems of both must close down before the house becomes dead.

Lights for the foyer, lobby, signs, etc., are supplied through a small switchboard in the front of the house, fed directly by the city. An emergency switchboard can pick up the load should the necessity arise.

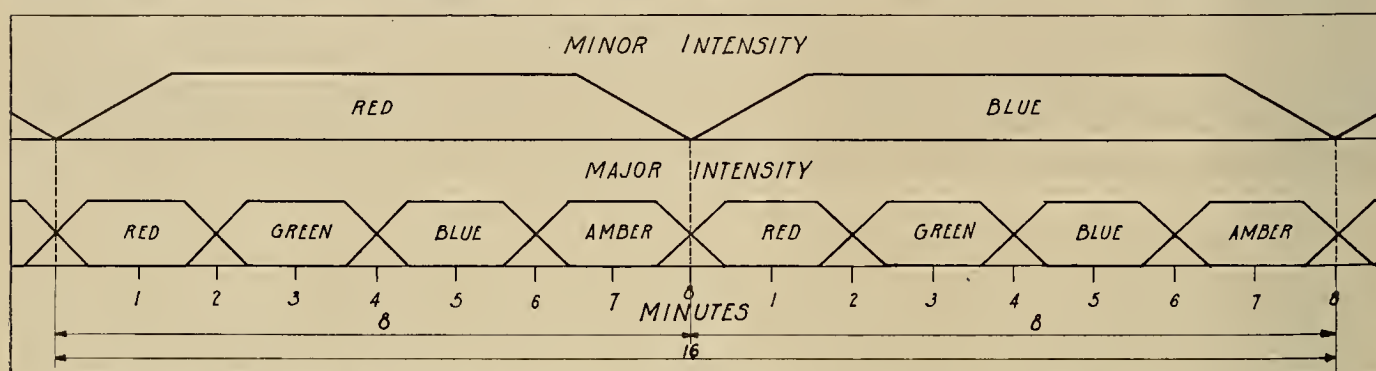
The main switchboard is located in the basement. From it energy is distributed to the motors driving the organ blowers, the ventilating fans and other auxiliaries and to the house and stage lighting circuits.

Feeders from the main switchboard are led directly to the contactor board, which, together with the dimmers, is in a specially ventilated room. From the contactor board they are carried to the dimmers and thence to a terminal rack. The house and stage lighting circuits, comprising approximately 490,000 ft. of wire, lead into this terminal rack, which for simplicity, is the counterpart of that in a telephone exchange. Each circuit is fused at the terminal rack.

To expedite the running down of trouble or breaks in a circuit, a system of numbering has been adopted which is followed throughout the house.

auditorium. Every spot where a light source might be hidden holds its battery of spotlights or its trough of lamps. This principle lends a highly desirable tone of mystery to the lighting scheme.

The lighting masterpiece of the playhouse is the central doily shown in one of the accompanying photographs. Above this are countless spotlights and lamps operated by a motor-driven rotating dimmer. Four colors, red, green, blue and amber, in the order named, focused in one direction, rise from zero intensity to a maximum and then fade. The shadows are lighted from the opposite direction with a minimum intensity of red and blue, each extending over one cycle of the maximum colors, as shown in the accompanying curve. A complete cycle requires sixteen minutes. Thus the color variations obtainable are almost limitless, including practically every gradation of the rainbow's hues. These lights are



An idea of the many color effects obtainable with the rotating dimmer which operates the lights above the doily is shown in this chart which depicts the rise and fall of color intensities over one complete cycle of sixteen minutes.

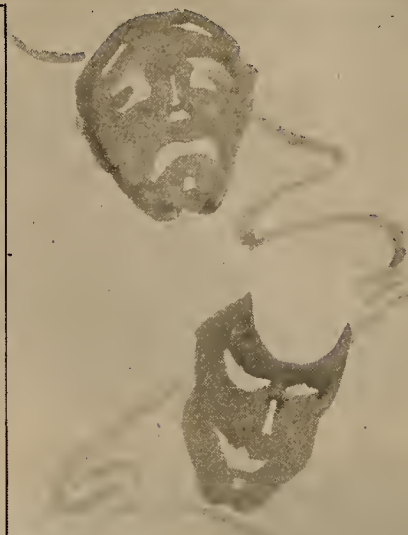
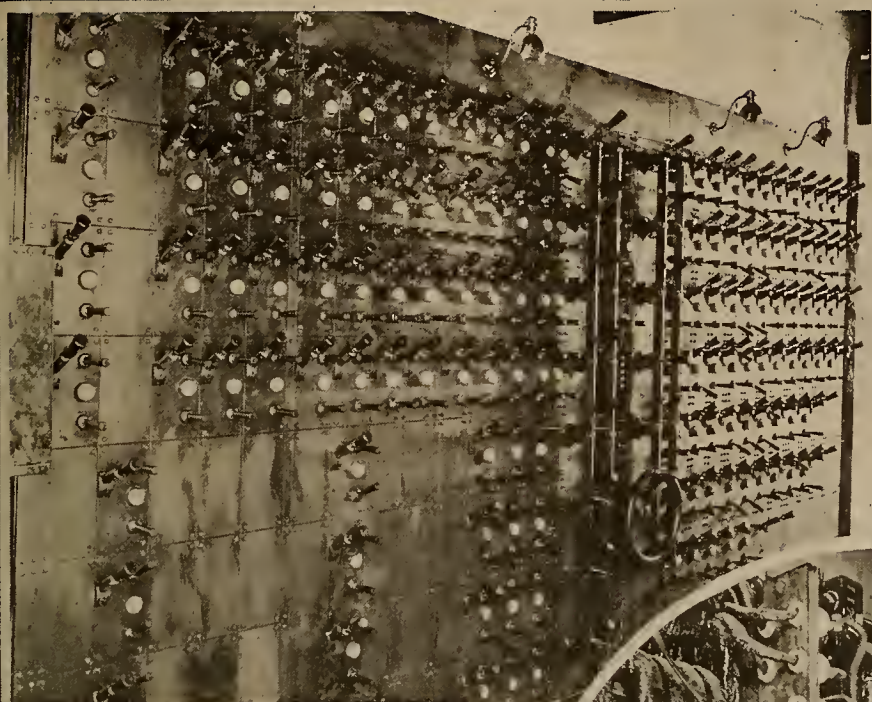
Circuits are numbered at the terminal rack, with corresponding numbers at the dimmer terminals, the contactor terminals and the stage switchboard or pilot board. A master wiring key is hung over the stage switchboard for the convenience of the operator. This system of numbering together with the terminal rack, makes possible a regrouping of circuits at any time should that be desirable.

The basic principle upon which the lighting of the theater has been designed is that of complementary colors. In other words, where an object is lighted on one side with a maximum intensity of one color, the shadow formed behind that object, instead of being allowed to remain black, is lighted with a minimum intensity of a color which is complementary to the maximum. Massiveness is the theme of the architecture. The walls, ceilings, and columns are rough concrete, with the marks of the wooden forms unerased. Primary colors have been used for decoration with reckless abandon. For effectiveness the architect has depended upon illumination. Lights are used to give an impression of depth where structural limitations prevented actual depth.

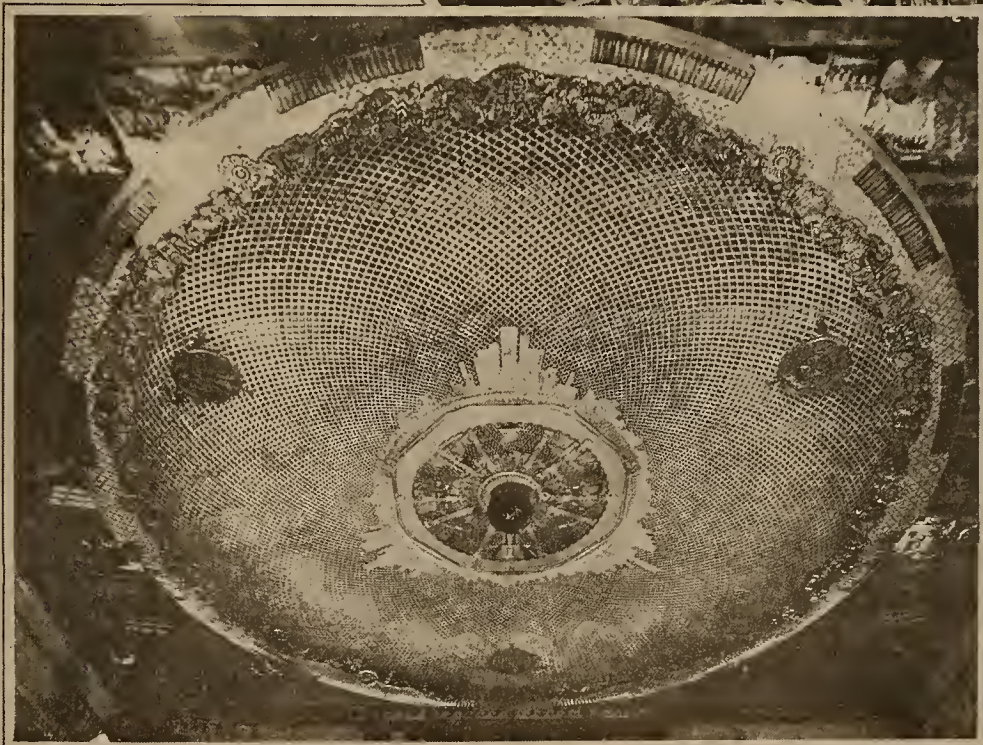
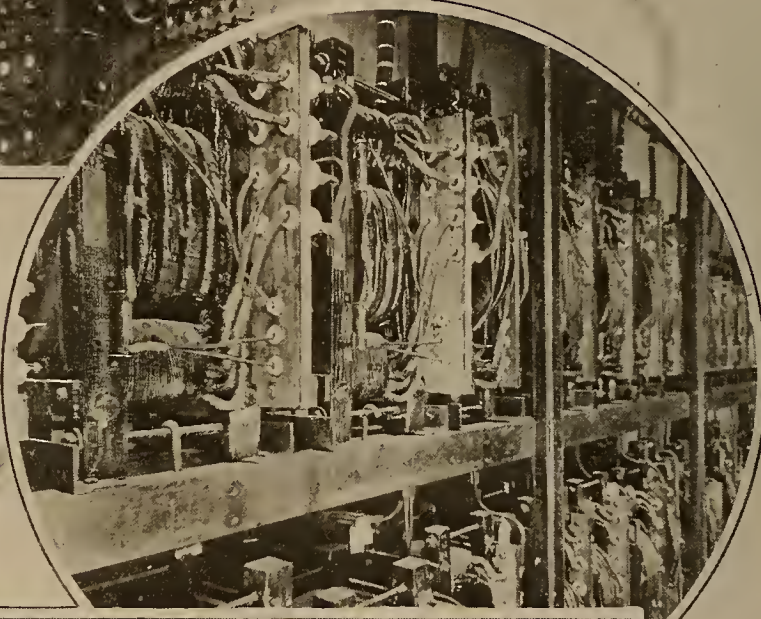
In the main auditorium, all light sources are hidden. There are no fixtures with the exception of those beneath the balcony where no other method of illumination was possible. A total of 780 baby spotlights with mirrored reflectors designed especially for the theater, and 10,400 lamps of every conceivable shape and wattage are used to light the

also used to obtain atmospheric lighting effects to accompany stage numbers or musical interpretations. With them the illusion of a storm, moonlight, a volcanic eruption, or a sunrise can be obtained with a simple setting of switches on the pilot board.

The heart of the lighting system is the stage switchboard and dimmers. Grauman's Metropolitan Theatre has the most complete electrical equipment of any theater in the world. The switchboard and the dimmers control the largest number of circuits of any stage switchboard, with a total connected load on the board in excess of 750,000 watts. Due, however, to the new types of switches and the reactance type remotely controlled dimmers, which were especially developed for this theater, this switchboard is so compact that it can easily be operated by one man. The board is 13 ft. long and contains 355 switches. There are 139 individual dimmer controls and 165 individual circuit controls. With the reactance type remotely controlled dimmers there are no hot leads to the pilot board. Where a dimmer will control a circuit involving 20,000 watts and 60 amp., the lead to the switchboard will involve but .1 to .2 amp. Dimmers of this type are from 95 to 98 per cent efficient. With two contactor coils on the contactor board it is possible to have two lighting setups on the pilot board involving the same circuits, either one of which can be switched on or off at the will of the operator. This is what is known as the pre-set selective type. Thus it is possible for the



Controlling the largest load of any theater switchboard in the world, the pilot board in Grauman's Metropolitan is at the same time the most compact and most flexible. In the circle are some of the remotely controlled reactance type dimmers perfected by the Ward Leonard Company for this showhouse, while at the bottom is a view of the central doily, the lighting of which is a masterpiece of the art of illumination. Complementary colors form the basis of the lighting plan.



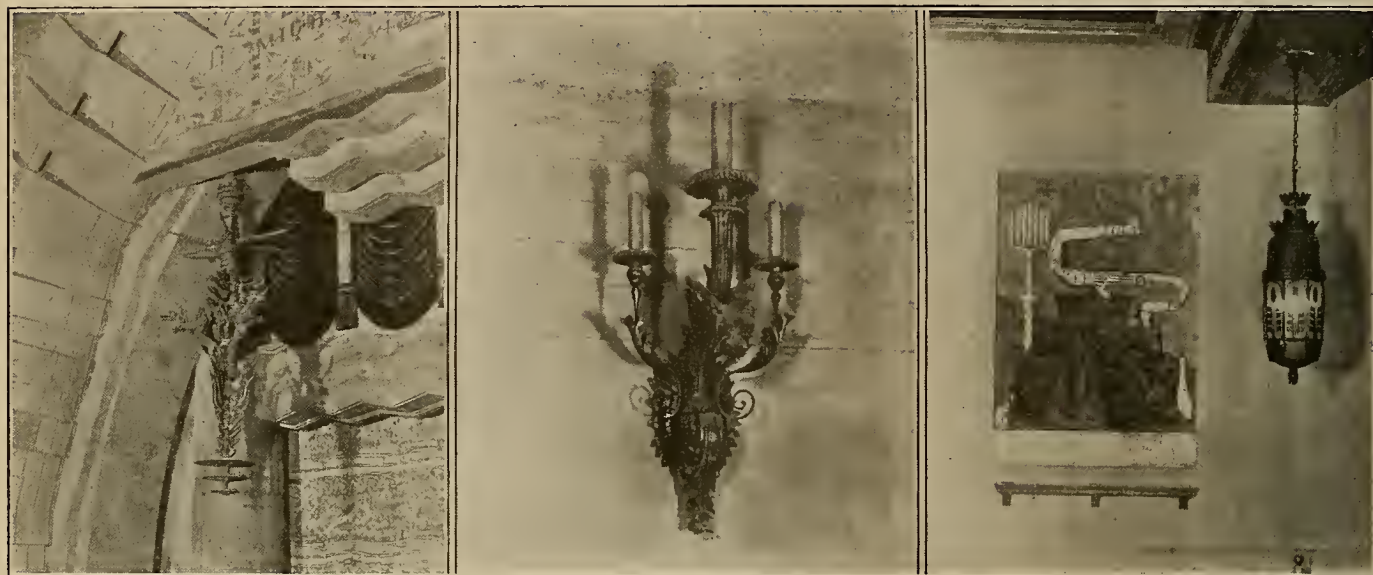
operator to switch on one set of lights and set up another involving many of the same circuits without disturbing the first. A set of score sheets are being worked out for various lighting effects, which, when completed, will enable the operator to prepare any effect desired with a minimum loss of time. Should the music or play call for a sunrise effect, he can run through these score sheets, pick out the one labeled "sunrise" and from it set the various switches from the numbers on the score. The switches and dimmers are so co-ordinated that the operator can play with the switches as a musician plays the notes on a score of music.

Pilot lights on the switchboard indicate when circuits are in service and should these lights fail

the platform to the same level as the stage. In other theaters, notably the New York Hippodrome, this is done hydraulically, and allowance must be made for valve leakage and settling. This equipment, designed by Holmes and Sanborn, cost approximately \$50,000. The organ console is raised and lowered in the same manner.

The theater contains two electric refrigerating plants in connection with its ventilating system. In hot summer weather, the air will be cooled before entering the house.

The system of house telephones is most complete. In addition there are two microphones on the stage with a loud speaker in the projection room for the transmission of cues.



Three striking details in the lighting of the theater, the one on the left showing one of the weird ornaments which casts a grotesque shadow on the wall, the center, a special fixture attached to the rough concrete wall, and the one on the right, a hanging lamp in one of the mezzanine lobbies.

to function, the operator knows immediately that there is a break in that particular circuit.

The stage switchboard, contactor board and dimmers were furnished by the Ward Leonard Electric Company, although the pilot board itself was constructed by the Hub Electric Company of Chicago. All were assembled before shipment and circuits numbered so that the installation was a simple matter. The assembled pieces were removed from the cars, set in place and bolted to the floor. The system of numbering enabled the contractor to connect the circuits with a minimum of trouble.

While the lighting system of the theater is the most noteworthy of any showhouse in the world, there are other features to the electrical equipment of an outstanding nature. Through a system of irreversible screws the orchestra platform can be raised a distance of thirteen feet and be made a part of the stage. Two 25-hp. motors drive these screws. The platform can be lowered at any one of three speeds and be controlled from the orchestra leader's platform or from the stage switchboard. Automatic self leveling machinery is used to bring

The organ blowers are driven by two alternating current motors. On the opposite end of the shafts are two direct current machines with automatic throw-over switches to take up the load in case the alternating current source fails.

In the projection room, the direct current leads to the machines are taken from a ledge on the front wall. Remote control switches on the projection room board operate a motor-generator set in the basement should the source of direct current to the projection machines fail. Wires lead from the machines to voltmeters on the organ console and the orchestra leader's stand. These are calibrated to read feet-per-second and record the speed of the film so that the music may be gaged accordingly.

It is evident, then, that in no other place does electricity find greater application than in the theater, not in the lighting alone but in almost every operation. And with the completion of Grauman's Metropolitan Theatre another progressive step has been taken in the development of theater lighting, and, lastly, in the development of lighting science itself.



An auto wash rack and the stone fire-place in the assembly hall are features of the park

Electrically Equipped Auto Park Is Municipal Asset in Boise

BOISE'S Auto Tourist Park was built during the spring and summer of 1918 and opened to the public on July 20, 1918. It was among the first, if not the first, tourist park established in southern Idaho. Touring by automobile was very much in its infancy and Boise was quick to appreciate the advertising value of courteous treatment to, and ample provision for the comfort of, those who visited the city in automobiles.

The first improvement consisted of an electric kitchen. The materials for this building were furnished by the local lumber companies and merchants and the labor was done by the labor unions. The electric appliances were furnished by the Idaho Power Company. Water was piped several hundred feet from a city main, the pipe being furnished by a wholesale hardware company. Money was contributed from various sources. This electric kitchen has introduced electric cooking to many women, from all parts of the country, who left feeling that as soon as they reached home they would look up the possibility of using electricity for cooking.

The next year other improvements were added in the way of additional toilet facilities, shower baths, and laundry room equipped with a Thor washer and two electric irons. An automobile wash rack was also built. With this equipment a party

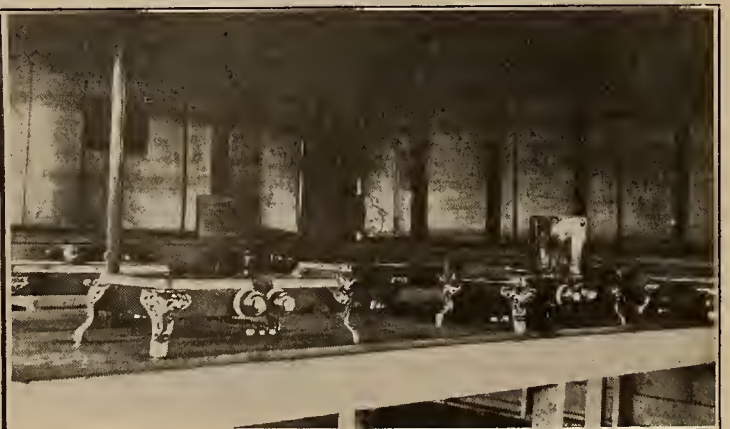
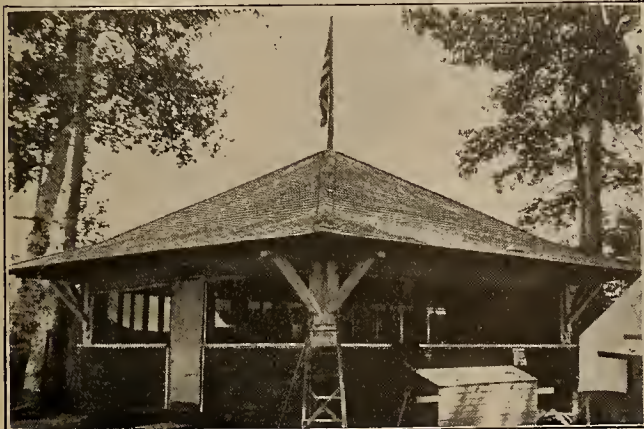
may enter the park with all the dirt and dust of a long trip, bathe themselves with hot or cold water, wash and iron their clothing, wash their car and feel "as good as new" before looking over the city, enjoying the amusements, or shopping in Boise's stores.

The greatest improvement was the erection in 1920 of an assembly hall with a ground floor of thirty-six feet by thirty-six feet, with a large fire-place constructed entirely of stone, donated by the Boise Stone Company.

The total investment in improvements reaches approximately seven thousand dollars. In the main the material has been furnished by the merchants and material men and the labor has been performed by the labor unions of this city.

During the 1922 season 3,442 cars were registered, carrying 12,107 passengers. Every state in the Union except Connecticut and Delaware were represented, Idaho having the largest number of registrations, with California, Oregon, Washington, Kansas and Illinois following in the order listed. There were three cars from Alberta and three from British Columbia, and two from the Philippine Islands.

The park has been in no way commercialized; the people who visit it are the guests of Boise and are treated as such. Many who came as visitors are now permanent residents of Boise City, or have purchased farms in the valley around.



Showing the community electric cook house and the arrangement of two-plate electric stoves within

Increasing Sales Twenty-Seven Per Cent by Use of Window Displays

By John W. Otterson

DISPLAYING his stock, has always been one of the most important problems faced by the seller of goods. Competition for the consumer's dollar dictates that, regardless of what a merchant may have to sell, he must be prepared to create desire of ownership by showing the buying public that which he wishes them to purchase. The electrical merchant must display electrical appliances in such an attractive manner that the desire to have the equipment will be put into the mind of the person who sees it, just as the manager of the traveling circus must give people some idea of what they may expect to see should they come to his show.

The opportunities of the circus to display its stock are even fewer than those possessed by the average merchant. The location of the circus "lot" is, of necessity, usually such that it cannot be reached without some trouble. The publicity department must make an extra effort to show the "wares" of the circus at a place where it will be more convenient for people to gather, and attract them to the out-of-the-way location.

The electrical merchant often has the same problem as the manager of the traveling circus. Both must attract attention to what they have to sell. The manager of the circus having no display ground which is convenient to the densest population in the city, must bring his display to the public and endeavor to get them to come a little out of their way to see the display, which is the parade.

Locations which are passed by many people are greatly favored by merchants, and naturally command a higher rent. An established location is often an asset and in many cases it is not possible nor practical to move from it, even though more pedestrians may be passing on another street or on the opposite side of the street. In such cases it is necessary for the merchant to make his display of such a nature that it will draw the people to his store.

An excellent example of how an electrical contractor-dealer in southern California has overcome the disadvantage of "the opposite side of the street" is displayed by the Field Electrical Company, of San Bernardino. This company is located on the sunny side of the street in a city which is subjected to exceedingly warm weather. In addition, all of the business establishments on that side of the block are non-merchandising in character, such as real estate offices, a barber shop, bank and court house. On the other side of the street are retail stores with display windows. Although there is a theater on

THROUGH the use of a series of feature window displays the Field Electrical Company succeeded in diverting pedestrian traffic from the opposite side of the street to its own side and added 62.3 per cent to its already large contracting business.

the same side of the street as the electrical store, it was found that the crowds uniformly crossed to the other side of the street before reaching the electrical store. A careful check over a period of two weeks showed that the advantage of the opposite side of the street was in the ratio of thirty-two to one.

The Field Electrical Company had therefore to display something which would

have the attractive powers of the circus parade and which would change the direction of the traffic on the street. Some incentive had to be created to make pedestrians walk down the sunny side of the street in preference to the shaded walk on the other side. The company could not present a street parade to display its stock, nor could it attract the people by the use of a steam calliope.

A campaign of feature windows was inaugurated under the direction of George L. Black, the first display being exhibited in December, 1921. Six months after the campaign had been started the other side of the street still held an advantage of fifteen to one. After nine months the ratio had been modified to nine to one, and at the present time the ratio is two and six-tenths to one in favor of the opposite side of the street.

The Record of Increasing Sales

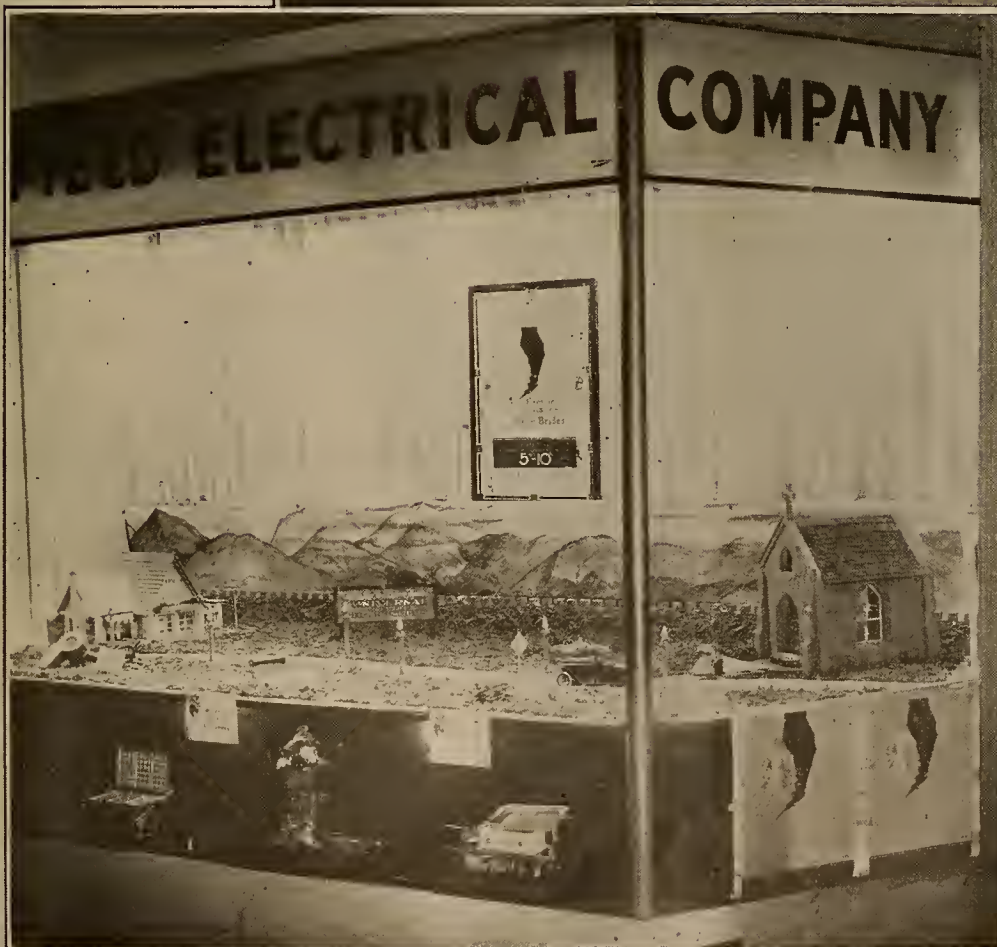
Within the first ten months, sales increased 27 per cent, at a time when other electrical dealers were reporting that sales were under those of the previous year. Contracting business showed an increase of 62.3 per cent over the months preceding and the sales of articles displayed in the windows showed an average increase of 39 per cent, indicating the direct sales value of the window over and above its major indirect purpose of general publicity and good-will.

The percentage of increase in sales from month to month, following the installation of the feature windows, compared with the same months of the previous year is as follows:

January, 43.8%; February, 33%; March, 24.5%; April, 62.3%; May, 25.8%; June, 47%; July, —16.6%; August, 24.5%; September, 28.8%; October, 17.6%; November, 36.7% and December, 43.3%. During December the company conducted the largest business in its history.

These figures apply only to the merchandising end of the business. The slump in July was caused by abnormally hot weather in San Bernardino. A large percentage of the population of the city moved to the beaches, taking away a large part of the market for electrical appliances. Following this loss,

Windows that made Sales



Who could fail to notice that the display had been changed when the upper window displaced the lower one? Three periods of the day were portrayed in a scene depicting a cool summer resort: sunset on the ocean, twilight, and moonlight. The exceedingly warm weather called for the exhibit. In the June Bride window lighting effects were used to secure scenes in daylight with sunset over the mountain panorama, changing to night at two-minute intervals. In the second scene the lights in the house and church went on and tiny street lights illuminated the road. Colored gelatine was used in the church windows. The detail in the display was complete even to the small pond upon which miniature swans swam, the tiny growing ferns and the reduced size road sign announcing "Many Turns Ahead."

the Field Electrical Company increased its efforts to stimulate business and the August sales recovered as the records show.

One of the first principles adopted by Mr. Black in his display work, was that in a series of displays, it is necessary to make successive windows show contrasting effects so that when a change was made, no one could fail to notice the new display. This principle was carried out not only in the character

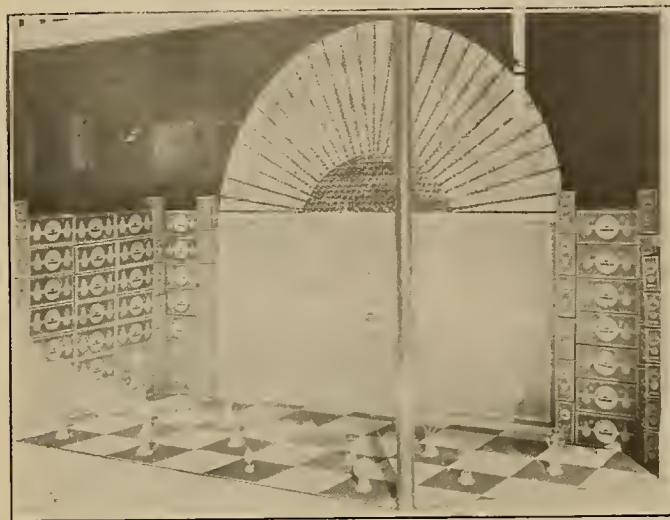
dows featuring some particular time event are changed immediately after the event has passed.

Windows that Tell a Story

Some of the most successful of the windows used have contained no electrical merchandise whatsoever, and on certain occasions it is the belief of Mr. Black that the electrical interest should be entirely subordinated to the "story" of the window. A display of this kind seldom brings direct sales, but the public is attracted to the windows and added prestige is given to the firm.

Such a window was the one which marked the Easter season. No electrical merchandise was shown in this window, which was a reproduction of the city of Jerusalem in miniature. Through the use of changing lighting effects three successive periods of the day were portrayed. The first effect presented the city at noon, then after a short period this way the lights were dimmed and a twilight scene was visible. The third effect was that of the small city at night, lights came on in all of the houses and the evening star was seen in the background. Amber gelatine used in the windows of the houses made the observer feel as if he were looking down on the twinkling lights from a great distance.

San Bernardino was the scene of the National Orange Show last year and this event was the occasion for a window which not only attracted crowds throughout the time that it was displayed, but in addition took first prize in a window display contest, competing with the largest department stores in the city. The window was a miniature of the Orange Show itself. Being in a position to know in advance



Eleven hundred cut glass crystals lighted by four X-ray reflectors were used in making the sun-burst which crowned this display. By the use of color screens on the reflectors the center of the sun-burst showed a deep red blending into all of the tints of a sunset. The large lamp carton was painted on beaverboard.

of the merchandise displayed, but also in the nature of the decorative scheme and particularly in the lighting effects. According to experts on lighting effects, the things constantly seen cease to be of more than ordinary interest, and by the addition of unusual lighting contrasts, a good window may be lifted into an important one. This theory has been amply proved by the Field Electrical Company, for its contrasts of lighting effects have been some of the most conspicuous parts of the display campaign.

The first window in the feature campaign, was a Christmas display which kept an interested crowd before it almost continually during the holiday season. It consisted of a very simple snow scene, made effective not only by the simplicity and good taste in design but also by a striking lighting effect.

Interest in the window was not evidenced solely by purchasers and visitors to the window, but almost every business man in town called in the store to find out how the effect had been produced. After the discovery that the people of San Bernardino were really interested in the window display, the company planned to continue the policy of feature windows and at the present time the windows are changed approximately every month. Exceptions are made where special holidays or occasions call for recognition. No set time schedule for the changing of the windows has been made, the company finding it better to allow the window to remain as long as it will hold the interest of the passers-by. As soon as interest begins to lag the display is changed. Win-



One of the window displays installed by the Field Electrical Company before the feature display campaign was started.

what the decorations would be, Mr. Black worked for two months preceding the exhibit on this window, which was complete in every detail. As one looked down on the miniature, he saw a continuous arcade of mission arches around the outer walls with a low overhanging tile roof, beyond the miniature oranges banked at an angle of 45 deg. Above the oranges was a panorama of the San Bernardino Mountains. Around a promenade, miniature California bears were placed on pedestals, and in the center of the arena, were feature exhibits of the show, including

a miniature electric fountain. The whole display was elevated to a height of about 3 ft., the space below being lined with oranges, to give the effect of a pedestal of oranges. Above the whole display was a large emblem, the "Sunkist" trade mark, done in cut glass jewels upon which four spot lights with color screen were focused. Over 150 flash light lamps were used in the miniature exhibit, mostly for flood lighting and spot light effects.

The arrangement of this window presents another of the fundamental principles of window display favored by Mr. Black. It is his firm contention that windows elevated to a point near the line of vision have much more drawing power than those with a lower base. In the case of small merchandise displays, a check showed that a window with the base elevated stopped an average of 22 per cent more people than did those where the merchandise was placed on the floor of the window. Where the window is to contain a combination of large and small appliances, the display is arranged to permit the window trimmer to place the merchandise on bases of graduated heights. Thus the larger appliances may be displayed in the front of the window without obstructing the view of the smaller articles which are placed in the rear. In addition this gives the display a definite scheme, indicating that the plan has been thought out beforehand. An effort is always made to display the merchandise in the circumstances under which it is to be used.

The Field Electrical Company has proved that the idea of a series of window displays is profitable and it will continue the campaign, for, as Mr. Black says, "We have educated the public to expect something new each month and we dare not turn back."

Other Merchants to Follow the Leader

The result is that 37 per cent of the firm's contracting business is in bringing old show window installations up to the new standards. The company has eliminated all competition in this field, for the merchants of San Bernardino have come to realize that the Field Electrical Company is the leader in the art of presenting window display features.

The company feels that few merchants realize the full value of their window displays. The Field Electrical Company has kept a record of increased sales and actual shifting of traffic due to the attraction of its windows, and feels that sales amounting to many times those which can be traced to any one window will result from the good-will and prestige established.

An indirect result of the feature show windows of the company, was an increase in the intensity of window lighting in San Bernardino, amounting to 754,200 lumens in the first six months of the campaign. Such an increase, of course, meant that the electrical dealer profited from the sale of lamps, reflectors and accessories—business which was an indirect result of the campaign waged to draw the people of the city to the other side of the street.



By elevating the smaller articles placed in the rear of the window, the window-trimmer can make them stand out as much as the appliances in the front of the window do. Note how attention was called to the convenience outlets, which were located at a point near the line of vision.

Future of Electrical Industry Discussed at N.E.L.A. Section Meetings

By S. W. Bishop

THE possibilities of the electric range, the development of the residence and store lighting load, discussion of new types of drive and control which will increase production and lower operating costs, furtherance of the use of electric cars and trucks in the cities, improved and more efficient methods of wiring, central station merchandise selling methods, and a continual round of entertainment and good time reflects the high lights of the recent commercial section and wiring committee meetings of the N.E.L.A. which were held in Denver, Jan. 24-26.

With a registration of over 63 from points outside of Colorado, the attendance, according to Oliver R. Hogue, commercial national section chairman, was far above expectations which, together with the interest manifested by western electrical men and especially the central station operators of the Rocky Mountain region, fully justified holding the meeting in the West, and the success which was encountered guarantees beyond a reasonable doubt the fact that other important national sections and committees will hereafter meet in the West.

All business meetings with the exception of that of the wiring committee were held in the offices of the Denver Gas & Electric Light Company and according to reports it was principally due to that company and the other electrical interests in Denver that the smooth running arrangements and the social features were provided.

Unusual interest was manifested in the merchandise sales bureau meeting presided over by F. D. Pembleton of the Public Service Company, Newark, N. J. Over one hundred were present at this session. Two subjects stood out over all others—the electric

range as a favorable power factor and revenue producer, and salesmen, their methods, compensation, and education.

Nearly the entire time of the first session of the bureau was given over to the range bureau. Discussion brought out the fact that many eastern central stations, especially the smaller ones, have thus far developed little interest in the range. At the same time, however, a number of the western and Pacific Coast members representing the principal central stations west of the Rockies, were able to present the complete analysis of the problem in the light of their experience during the past ten years. Although, as was stated by several of them, the range business has been purposely conservatively developed, it appeared from the discussion that eastern conditions had been developed even more conservatively. Officials of the largest companies producing ranges were present and took an active part in the debate, especially George Hughes, president of the Edison Electric Appliance Company, and M. C. Morrow, of the Westinghouse Electric & Manufacturing Company.

C. O. Dunten, Central Illinois Public Service Company, chairman of the range committee, in his report which was accepted for presentation at the national convention in June, recommended the preparation of comprehensive data which could be supplied to all members and the issuance of at least four consumer booklets by the Society for Electrical Development, working with the N.E.L.A. and manufacturers' committee.

Frequently there were heard references to the high cost of the more desirable ranges and it remained for R. W. Clark, of the Puget Sound Light & Power Company, a central station man, to defend the



The commercial section meeting of the National Electric Light Association attracted these men and their wives to Denver. Reading from left Mrs. Frank J. McEniry, Mrs. D. R. Gibson, Mrs. O. R. Hogue, H. A. Lane, A. Goldman, A. W. Childs, J. L. Lufkin, A. F. Berry, J. R. Cox, Sidney W. Bishop, George F. Oxley, Mrs. J. J. Cooper, Harold Wright, Wm. L. Goodwin, Oliver Hogue, W. A. Moser, H. S. Sands, L. J. Bridgman, George E. Lewis, N. T. Wilcox, J. J. Kirk.

manufacturers. He explained that it was his personal belief that the trouble would be found to lie in the hands of the central stations because they do not produce sales in sufficient volume to bring the price down through greater production. It was later brought out that electric ranges sell for 2.8 times as much as standard gas ranges, the difference in price having something to do with the popularity of the cooking medium.

The wonderful possibilities in the residence and store lighting load which comprises at the present time 58 per cent of central station revenue were outlined by G. Bertram Regar, chairman of the lighting sales bureau, and it was the decision of that bureau to confine its effort, during 1923, to these specific phases having in mind the ultimate doubling of intensities in the average home and store.

New types of drive and control which will increase production and lower operating costs were discussed by the power sales bureau of which C. K. Nichols of the New York Edison Company is chairman. It was pointed out by western men that there exists a large field in the further electrification of the lumber industry and oil wells of California. It was reported that there is at this time 50,000 hp. of motor drive in the oil fields of the state on the lines of one central station and that the biggest problem there, is the application of electricity to drilling, as manufacturers apparently do not produce the type of equipment required for such service.

Success of the industrial heating school movement resulted in a decision of the power sales bureau to establish such schools in the more important industrial centers in cooperation with the various geographic divisions.

Many interesting facts were reported from the larger metropolitan districts on the more economical operation of electrical vehicles as against other types and the increase on central station loads as the result. Charles R. Skinner, Jr., of the New York Edison Company presided. Later at the executive committee meeting it was decided to change the name to "Electric Truck and Car Bureau."

R. S. Hale, of the Edison Electric Illuminating Company of Boston, presided at the standardizing and testing division, electrically equipped furniture, and national wiring committee meetings. At the latter, which was a whole day session, at the Brown Palace hotel, about ten members of the national committee were in attendance. Among the principal subjects discussed were the 660-watt rule and the thoroughly grounded neutral.

The national convention in June will be of unusual significance to commercial department executives, judging from the discussion of the section executive committee, on the last day of the meeting. Selling methods and business getting ideas it is believed will be the chief items of interest, in the opinion of O. R. Hogue, the section chairman. He also believes it will be a splendid opportunity for all commercial men to become thoroughly acquainted with the more and better business movement which is being sponsored by the N.E.L.A.

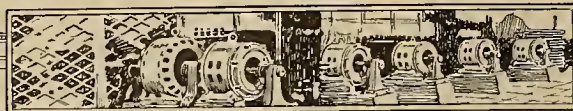
Entertainment as provided by the Denver Gas & Electric Light Company for the visitors included a theater party, a banquet on the following night at which nearly 200 electrical men were present, a motor tour of the Denver mountain parks followed by a trout dinner and dance at the Motor Club in Bear Creek Canyon. At the banquet, John J. Cooper, chairman of the Denver Electrical Cooperative League, presided and the principal speakers were George Hughes, William L. Goodwin, A. K. Baylor, R. S. Hale, H. E. Lane, Samuel Adams Chase, O. R. Hogue and J. Frank Dostal, president of the Rocky Mountain geographic division.

All the visitors attended the weekly meeting of the Cooperative League, Jan. 24, and on Jan. 27 about forty-five of the visitors made a one-day trip to the Colorado Springs region. George Hughes and J. F. Roche of the Edison Electric Appliance Company were hosts at the Antlers Hotel for luncheon and in the evening the Colorado Springs Light, Heat & Power Company entertained at the Broadmoor Hotel through O. F. Lackey, vice-president, and J. Frank Dostal, general manager.



to right they are: Mrs. O. H. Caldwell, Walter C. Heston, Mrs. Wm. E. Clement, Frank J. McEniry, Mrs. Fred R. Jenkins, W. S. Byrne, Charles R. Skinner, Jr., Horace S. Meese, O. G. Kirk, D. C. Ray, Ernest Pragst, L. C. Spake, Mrs. R. G. Gentry, J. L. Harvey, J. F. Roche, H. E. Sandoval, Bernard Lester, J. J. Powley, J. J. Cooper, Walter Fagan, Fred R. Jenkins, Wm. E. Clement, C. K. Nichols, Vernon M. F. E. L. Milliken, Harry Bullock, A. M. Frost.

ELECTRICITY IN INDUSTRY



By Louis F. Leurey
Industrial Electrical Engineer

Fitting Electrical Lifting Magnets to the Needs of the Industrial User

DURING the war there arose proposals that ships be equipped with huge magnets which, when energized, would draw submarines to them where, being helpless, they could be destroyed. In peace times equally impossible proposals are made with respect to magnets. Such propositions overlook the fact that while magnetism may be detected through long distances by means of delicate instruments as, for instance, the earth's magnetism by the compass, yet drawing power in large, usable, effective quantity can only be exerted through short distances up to 12 or at most 15 in.

Where the magnet can come near or in contact with its pull or its load it is wonderfully effective as its universal use in steel mills, blast furnaces, foundries, forge plants, scrap yards, railroad yards and all other places where iron or steel in quantities must be handled proves, and in all such situations

pany at Indiana Harbor, Ind., to handle and load its product. The load shown consists of thirteen 90-lb. per yard rails each 40 ft. long, the total weight of the rails being 15,600 lb. These magnets require little head room, are strong mechanically and all their magnetism is concentrated at the lifting point. They will lift seventeen or eighteen such rails if stacked in double locked layers.

Magnets in the Mining Industry

A magnet about 40 in. in diameter and having an energized coil wound for continuous service sup-

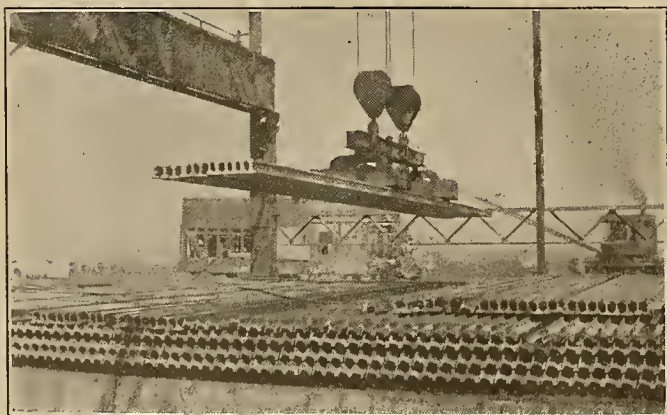


Fig. 1—Two super-rectangular magnets lifting 15,600 lb. of railroad rails

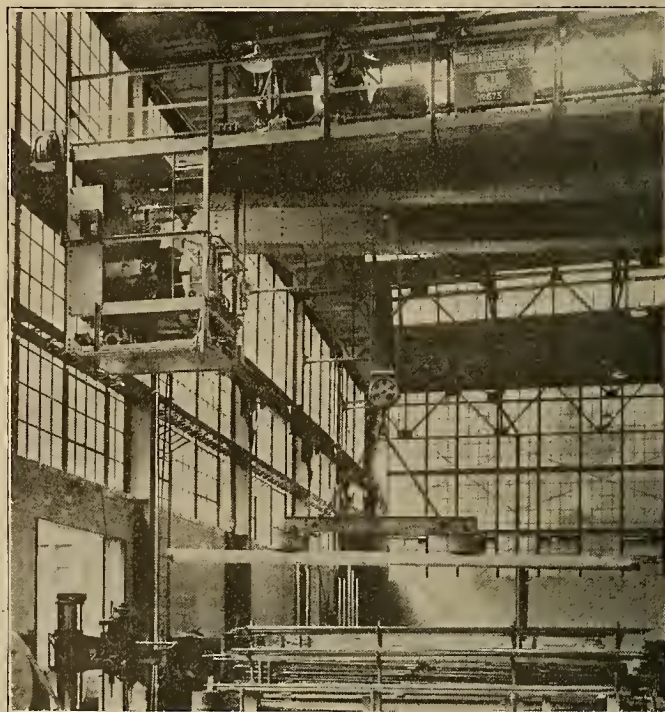


Fig. 2—Two round magnets used to handle pipe in a Chicago warehouse

a magnet will save its own cost in a very short period of time.

Most magnets are used for loading or unloading iron or steel materials but there are many related uses not so common or well known but equally interesting and important economically. One of these latter cases is quoted below.

Fig. 1 shows two super-rectangular magnets mounted on a beam and controlled in parallel by the operator in the crane cab. These magnets are two of nine used by the rail mill of the Inland Steel Com-

ported above a belt conveyor carrying silver ore at the Fresnillo, Mex., plant of the Mexican Corporation, S. A., is shown in Fig. 3.

Fig. 2 shows two 20-in. round magnets on a beam and controlled in parallel by the operator in the crane cab and used in the Kelly-Jones, Chicago warehouse, to store and afterward to re-load, on delivery wagons, pipe from the smallest to the largest sizes. The system is effective and saves considerable time and space. The Crane Company's pipe warehouse in Pittsburgh has similar equipment.

The object of this installation is to extract stray or tramp iron or steel from the ore as it passes under the magnets. If such pieces are not taken out they will break the crushing rolls causing great delay

new business along these lines. Engineers are studying with a great deal of interest the application of the new rates but sufficient time has not yet passed to tell whether they will be more favorable

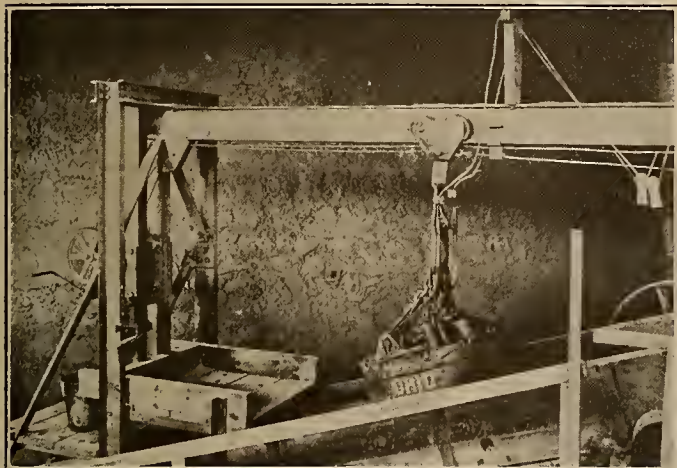


Fig. 3—Continuous service magnet to pick small pieces of iron from a conveyor carrying silver ore

and expense. Small magnets have been in use for this purpose in flour mills for some time but in late years many large ones, such as that shown, have been used over belt conveyors of copper and lead ores, coal and other materials to save the crushing of machinery, and in some cases also to prevent the admixture of iron with the product.

There are many other useful and interesting special magnet applications, but always the limitations noted in the first paragraph must be remembered. Many Pacific Coast concerns are now using these magnets but they are being used principally on the rather commoner forms of application.

The Electric Furnace in the Western High Grade Metal Foundry

ONE of the important undeveloped markets for electric usage in the western states is the application of electricity through the medium of the electric furnace in the melting of brass and in the production of a high grade of electric steel.

With the heavy investments made recently by the major power companies of the Pacific states, resulting in an enormous increase in facilities for electrical service, a great amount of interest is being aroused in installations of this character. For a number of years it has been a well known fact that electricity offers many advantages in its applications in furnaces that are not offered by the primary fuels. A great curtailment of stack losses in melting brass and other metals of a similar character has led to its introduction to a wide extent in this field. The ability to produce steel of a high and exact quality by controlling the heat and mixture has also led to considerable development in this department.

The only handicap to date has been the question of electric rates, and in view of the recent reductions in rates among the major power companies of California there should be a considerable stimulation for

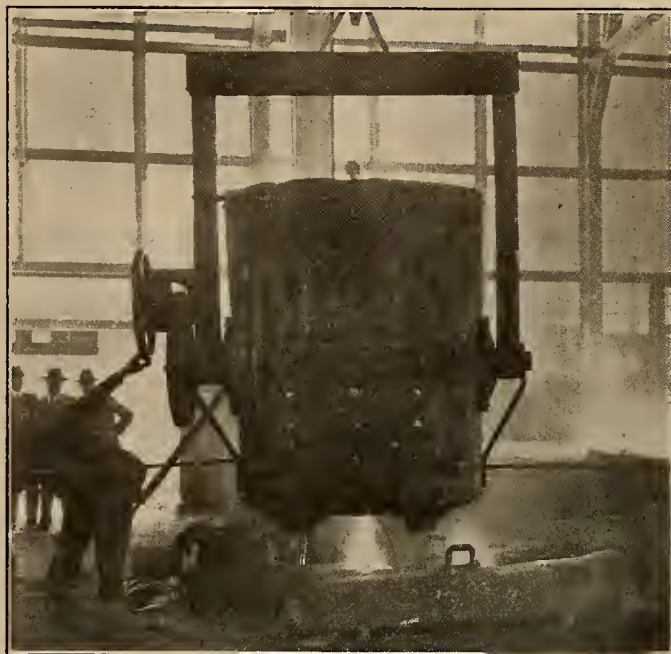


Fig. 4—Pouring metal from electric furnaces operated by the Electric Foundry Company, of Sacramento, Calif.

to the electric furnace than the older rates which were in effect prior to Jan. 1. The proposed new rates give considerable prominence and advantages to high load factor features and all such applications



Fig. 5—An electric furnace ready to discharge high grade metal to be cast into ingots

as come under this class will undoubtedly receive a very decided benefit from the new schedule.

Figs. 4 and 5 show applications of the electric furnace with the metal being poured into the molds, at the Electric Steel Foundry at Sacramento, Calif.

JOBBER, DEALER AND SALES AGENT



Sell the Electrical Product to the Industry First The Salesman Must Be Enthused Over What He Has to Sell Before He Can Interest the Possible Customer

By J. E. BULLARD

In building a market for any product, success depends upon how many people can be made to want it and how much they can be made to want it. The automobile industry has grown to the vast proportions, largely because so many people have been made to want an automobile more than they want anything else. Many people will make any sacrifice in order to own an automobile.

A manufacturer of men's hats made an investigation which indicated that the sales of men's hats and of clothing for men had actually fallen off more than they should have, during the depression, because men wanted to own a new automobile or to keep the old one running more than they wanted a new hat or a new suit of clothes. It was just a case of spending money for that which was most desired.

The desire for automobile ownership is a fact. It has been brought about by extensive advertising and publicity, but

the automobile manufacturer had something greatly in his favor. The automobile a family owns is something that all their friends and neighbors see. It provides a display of prosperity that has never been possible before. It appeals to the vanity and the pride of people to an extent that even fine clothes do not. Here is an appeal that cannot be made in building a market for all products.

The owner of a washing machine, for example, cannot display that machine to as many people as can the owner of an automobile. Perhaps that is the reason why there are some ten or twelve million automobiles in use and only about two million electric washing machines.

One of the best ways to make other people want that which we have to sell is to make everyone in the industry want it to such an extent that they will make great sacrifices in order to possess

the electrical business used all the electrical appliances on the market, even though these had to be sold to them at the manufacturer's cost. It would help a great deal more, if everyone could be made to want them so much that they would make every possible sacrifice to possess them. It is far more profitable in the end, to spend the money in making the employees want these appliances, than it is to allow them discounts on their purchases.

An incident that occurred in a jewelry store recently shows how the desire to own a thing may be made strong enough to overcome even serious objections. A man entered the store to look at some diamonds, and was waited upon by a stone expert who knew practically all there was to be known about diamonds. He showed the customer various stones of about the quality desired and came to one that made a special appeal. This stone, however, was just a little more expensive than the customer had planned to buy. He was about to leave the store when the owner came up and began talking to him. Before the man left the store he bought the stone.



A show room of this character will instill enthusiasm in the salesmen of the firm and confidence in customers who enter to purchase electrical goods.

The question naturally arises as to why he would not buy it from one man and would from the other. The answer is, the difference in the attitude taken by the clerk and the proprietor towards precious stones.

The clerk had only a scientific interest in these stones. He was interested in diamonds only as stones and he had no very great desire to possess them. The proprietor of the store was in this business because he loved precious stones. There was not a stone in his entire stock that he would not have liked to have had for himself. All of his profits he did not have to put back into his business, he was using in building up his own private collection of stones. When the owner of the store talked to the customer he brought a new selling force to bear. He had an enthusiasm for that stone that was contagious and the customer caught this enthusiasm to such an extent that he felt that he would be losing a great opportunity if he left the store without the stone.

This kind of enthusiasm is more effective in building a market for any product than any other business building medium. The difficulty lies in making it sufficiently widespread.

If all the employees and all the stockholders of all the central stations in this country, if all the contractors and all the dealers in this country, if all the manufacturers and their employees were as enthused over the use of electrical appliances as this jeweler was over the possession of precious stones, it would not be long before there would be many million more washing machines in use than there are now. Those people too far from any distribution system to be able to buy central station current could be influenced into installing plants of their own in order that they could use electric washing machines and other appliances.

There are in this country more than twenty million families. The cost of electric current and electric washing machines is now so low that every one of these families may well be considered as a prospect. Where the income is so low that the mother must take in washings to help support the family, the washing machine will help her make more money because it will enable her to do more washings. By purchasing the machine on terms she will be able to use her increased earnings with which to pay for it. Therefore, it is not wise to deduct any of the twenty million families as those which are not possible purchasers of electrical washers.

As a matter of fact, the practice of limiting the number of prospects for any article or service to a certain class is dangerous, if for no other reason than because it makes it appear as though those who sell were making a better showing. There is no real excuse for any contractor, dealer, or employee of an electrical company not owning an electric washing machine. There is certainly no excuse for the stockholders not owning them.

The whole thing simmers down to a lack of sufficient desire to own one. A lot of these people would rather own an automobile than an electric washing machine and they do own an auto-

mobile and have no electric washing machine. Ask any group of people connected with the electrical industry, just how many have an electrical washing machine at home and there will be a large proportion who admit that they do not own one. Usually there will be a larger number who own their automobiles than who own electric washing machines.

The same thing is true of all other electric appliances. The electric washing machine is not always considered

a thing, it is a case of desiring it. Let anyone desire anything to a great enough degree and sooner or later he will find some way to possess it.

Fifteen years ago anyone who predicted that as many automobiles as are in use today could be sold, would have been called insane. Statistics could have been quoted to show that it would be impossible to sell so large a number of cars in a country of 105,000,000. Pessimists said that there simply would not be enough people with incomes large



The electrical man who has an installation in his home similar to this, is in a position to know of and become enthusiastic over the actual operation of the appliances. His enthusiasm will be passed along to customers he meets daily.

the one electrical appliance that should be in almost universal use. This is partly due to the fact that not sufficient enthusiasm has been aroused for it. Yet as has already been stated, there is not a reason why it should not be sold to every family to which a supply of current can be given. The poor washwoman may prove to be a better prospect than the person with a larger income. It is the domestic appliance that perhaps offers greater possibilities than any of the others.

One reason why more electrical appliances have not been sold is that it has been taken too much for granted that all people employed in the electrical industry will buy these if they can afford them. That little word 'afford' has stood in the way of thousands upon thousands of sales. It has given a perfectly good excuse to a lot of people for not buying. Yet the strange thing about all this is that though these same people can't afford to buy electrical appliances they do seem to be able to buy automobiles. After all, it is not a case of affording

enough to buy them. Yet today we find women take in washing to earn the money necessary to pay for the gasoline needed to run the family car. It is just a case of creating a desire.

Just at the present time, one thing that is exceedingly important in the electrical industry is to create a greater desire on the part of those engaged in the industry to own appliances. It must be borne in mind that, compared with the prices of automobiles, all electrical appliances are inexpensive. Therefore, it is quite evident that if a family doesn't have these appliances it is because they are not desired. If those in the industry don't desire them enough to possess them, how can we expect those outside the industry to desire them, especially to the extent of putting off buying something else in order to buy electric appliances? To build a satisfactory market for electric appliances, then, it is necessary to create a greater desire for them on the part of those engaged in the industry. Here is an opportunity for some real salesmanship.

New Contract Form Prepared for Electrical Men

Legally Correct Form to Protect Contractor on Bids Submitted for Installations that He Has Figured

The contract which the electrical contractor presents to the home owner whose house he intends to wire has long been a rather clumsy affair. There have been as many styles of forms for these contract blanks as there have been men engaged in the business. Every electrical contractor has had rather bitter experiences with these forms, often finding that they could not be enforced at court.

Many efforts have been made by individual contractors, to establish a form which would be flexible enough to make it usable in all cases and which at the same time would not be too complicated or involved. The average contractor does not want to be bothered with a mass of detail to be observed while making out a contract and yet he wants to have definite specifications for the job, written into the contract which is to be signed by him and the house owner.

In the past a number of contractors have not had the opportunity to organize a plan for the formation of a contract blank, and have as a result often used forms which were vague and of no real value to the contractor or the person owning the house. These forms have often been of such a nature that they had no legal standing, and provided no protection to either party to the agreement.

Cooperative associations of contractor-dealers have endeavored to bring out forms which could be adopted as the standard for use by members of the association, but most of these suggested blanks have been found to be lacking in some vital part. The greatest trouble experienced has been in making the forms legally "leak-proof." Omissions of items that, to the electrical contractor, might seem of trivial importance, have been found to make the contracts invalid when taken to court by the contractor trying to recover a judgment against the house owner. Several feasible methods of laying out the items to be included in the contract, have been used, but stipulations concerning the rights and duties of the two parties to the contract have been neglected.

One of the principal things that has not been covered by the contract forms prepared in the past, is the protection of the contractor working on a building which is covered by a lien of some character or other, thus precluding him from attaching the property, should he be forced to take action to recover for work done on it.

In an endeavor to correct some of these evils of the haphazard contract form, the Los Angeles branch of the California State Contractor-Dealers' Association worked out a form which relieves the contractor from any doubt as to the validity of the contract. In drawing up the form, the association secured the services of Earle E. Moss, a Los Angeles attorney, in order that the form might be legally correct in every detail.

The face of the contract, which is shown on the opposite page, is made up to facilitate the listing of the items that were considered in making out the estimate sheet. The price of the job

is listed on the sheet, thus giving the builder of the structure a signed statement of the cost to him and when this sheet is signed by both the contractor and the builder, it is a binding agreement between them.

The arrangement of the sheet gives the contractor an additional check on his estimating figures, as he transfers the several items from that sheet to the contract form before presenting his estimate to the builder. Thus should he have failed to figure any item while making the estimate, this will show up while making the entries on the contract as one upon which no price has been placed. The contract also stipulates that the price quoted includes only those items specifically mentioned, thus giving still greater protection to the contractor.

On the reverse side of the contract, all of the necessary terms and conditions to make the contract binding, are printed. The stipulations are as follows:

"All work to be done in a good and workmanlike manner, and in accordance with the ordinances, if any there be, of the city in which it is to be performed, and with the laws of the State of California, and when not covered by such ordinance and laws, the rules of the National Board of Fire Underwriters shall apply.

"Should there arise any condition to necessarily hinder carrying on the work as specified and ordered, and over which the electrical contractor has no control, the electrical contractor is at once entitled to and must be paid on demand an amount not less than 80 per cent of the estimated cost of work that has been performed and material furnished, and that the balance of the estimated cost of work performed and material furnished must be paid within sixty days from date of notice by the electrical contractor of his inability to further proceed with the work.

"In the event of the failure to pay any installment or installments on the contract price herein provided for, when due, then the electrical contractor at his option, which option shall continue during all the time of such default, may remove from the premises any materials or fixtures that shall or may have been installed therein by him or delivered by him to the premises, and may apply the value of such materials or fixtures so removed on account of any indebtedness due him on the contract. The option herein provided for shall be in addition to any and all other remedies the electrical contractor may have to enforce his contract, either in law or equity.

"The electrical contractor is not familiar with the condition of the legal title to the property covered by this agreement, and if at the time of the execution of this agreement or at any time prior to the actual commencement of work by the electrical contractor under this contract, it should appear that there is a trust deed, mortgage or judgment lien upon said property, or said property is subject to a first mortgage or first deed of trust, then and in that event the electrical contractor may, at

his option, refuse to further proceed with the work, and the electrical contractor shall in no way be liable for any damages whatsoever by reason of such refusal. In the event the electrical contractor shall abandon the work for either of the reasons above stated, or in the event of loss by fire, the price mentioned herein for the completed work shall be disregarded and payment in full for all work done to that time shall be immediately due and payable, the value of such uncompleted work to be determined on the basis of the cost of labor and material to the electrical contractor plus 25 per cent of such cost.

"If suit be commenced or other legal proceedings be taken to enforce the payment of any amount due under this contract, a sum equal to 25 per cent of the amount of this contract shall be added to such amount for attorney's fees.

"Payment for roughing in work or allowing later work to proceed shall constitute an acceptance of the roughing in work as satisfactory and no claim shall be made against the electrical contractor for damages or errors after the work has been passed by the city inspector. 'Roughing in' work includes only work necessary to pass 'Roughing in' inspection under the ordinance, laws or rules governing the work. The electrical contractor shall not be responsible for damage to fixtures after they are installed. The electrical contractor shall not be held liable for any loss, damage or delays occasioned by fires, strikes or other causes beyond his control.

"Any change in the location of an outlet from that shown on plans or as originally agreed upon shall constitute an extra outlet, payment for which shall be made on a time and material basis.

"All appliances, equipment, fixtures, switches, and other material or property of any kind or character whatsoever, which may be removed from the structure upon which they have been placed by the contractor under this agreement, without the destruction of any wall, floor or foundation, shall not be considered as affixed to the said premises, and shall remain the property of the contractor until full payment for same shall have been made. All payments made under this agreement shall be applied first to the payment for labor, and secondly to the payment for material affixed to said premises, and the remainder to the payment for fixtures, appliances, equipment, switches and other property furnished or owned by the contractor."

The contract form has been adopted by several contractors in Los Angeles already and the branch of the California State Contractor-Dealers' Association in that city is considering adopting the form as a standard one to be sponsored for use by association members. The form has not been copyrighted and can be used by any contractor wishing to use it.

The form can be printed upon the regular letter-head of the contractor by any printer and could be put out in medium sized quantities at a reasonable price. The reverse side of the contract will necessitate the running of the form through the printing press twice, but the added protection will make this expense well worth while.

Owner Address..... Phone.....

Builder Address..... Phone.....

Location of building.....

Billing address

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| Rooms | Ceiling Outlets | S. P. Switches | Bracket Outlets | Three-way Switches | Convenience Outlets | Iron Plugs | Watts | Bells |
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The estimate for furnishing the necessary labor and material for complete installation of wiring, as above specified, is.....

.....Dollars (\$.....), payments to be made as follows: 70% of the contract price when the roughing-in inspection is passed; balance when the final inspection is made. Payments for all extra labor and material shall be made at the time such extra labor and material are furnished. This estimate is governed by the terms and conditions herein contained and printed on the back hereof.

If not accepted in writing, this offer shall expire.....days from its date.

Dated.....

Accepted: _____, 192_____

Electrical Contractor.

By.

This form for the presentation of bids on electrical installations figured on by the contractor was prepared through the cooperation of the Los Angeles branch of the California State Contractor-Dealers' Association and an attorney of the southern California city. It is designed to enable the elec-

trical contractor to present a contract to the builder of a structure which will be compact, complete and legally binding upon both parties to the agreement. The reverse side of the model form is reproduced on the preceding page and both sides make a complete legal contract.



This five-room bungalow, belonging to a Greeley, Colo., man, was displayed as an electrical home by the electrical interests in the city

The Electrical Home and the Small-sized City

Colorado Owner Loans Residence to Permit Electrical Men to Present Modern Ideas to Rocky Mountain City

Approximately 5,000 people were shown how the modern home can be electrified, when through cooperation by the central station company, the electrical dealers, the house furnishing company and the owner of the home, an electrical home was exhibited in the town of Greeley, Colo. The home was open to visitors for eight days only and during the time it was exceedingly popular with the residents of the town, which has a population of about 11,000.

Immediately after the home was put on display beneficial results were felt by all of the electrical contractors, and other firms cooperating in the display were rewarded in like manner, according to L. R. Storey of the Home Gas & Electric Company, the central station which sponsored the exhibition.

The home was designed and built by A. M. Kindred for W. F. Jones, an employee of the Greeley central station, and was arranged with a view to its being exhibited as a model electrical home as a result of the electrical home which was displayed in Denver last summer.

Working with the builder of the house the electrical men arranged to install outlets and appliances to make the house fully an electrical one. During the wiring of the home, the power company officials and the electrical contractors worked together to secure the most advantageous arrangement of outlets, switches and conduit.

This system was found to be fairly equitable and all concerned were satisfied with the locations given to them. During the exhibit, all of the firms were allowed to have their representatives present that their appliances might be demonstrated to the visitors. As it worked out, the general thing was that there were about four or five guides present at all times to conduct the guests around the home and to give information.

Furniture and general furnishings were provided by a local furniture store. Everything was supplied which would make the home attractive and livable.

In planning the illumination of the home, it was decided to eliminate overhead fixtures. Wall brackets, floor

lamps, and table lamps were the only lighting fixtures installed. Particularly pleasing lighting effects were secured in this way, and many new ideas in illumination were given the home owners of Greeley.

At the fuse box preparation was made for replacing fuses in the dark. A small electric light was attached to the line ahead of the fuses, so that if the fuses were blown, the home owner could replace them by this light which would not be affected by the fuses.

Instead of connecting with the distribution lines of the power company with overhead wires, the electrical contractor in charge of wiring the home used conduit which was laid underground. Underground conduit was also used between the house and the garage. A two-way switch controlled the garage lights.

Among the electrical appliances and devices installed in the home were: a ventilating fan for the kitchen, an electric water heater with automatic control, an electric fountain, an electric range, an electric refrigerating machine, electric washing and ironing machines, and an electric vacuum cleaner. Convenience outlets were placed in every room in the house and were located so that they were readily available for use. Several three and four-way switches were placed in the home to enable the owner to control the lighting of halls from different points.

The purpose of the electrical firms was to increase the number of electrical appliances in use in Greeley. No particular style or make of appliance was featured. All of the lines of electrical appliances sold in the town were exhibited and the results show that the display was well worth the effort spent.

The electrical firms that participated in the demonstration were: The Home Gas & Electric Company, the White Electric Company, the Bryant Electric Company, the Greeley Electrical Supply Company, and the Herdman Electric Company. According to the men from these firms the plan of displaying a home, built by a man for his own use, is an exceptionally good one to follow in the smaller community.



The home was well supplied with electrical features, as may be seen in these two views of the dining room and living room

Where the West Begins

By JOE OSIER

Speaking as one Westerner to another'n, comma, I would like to meet up with the poet who dashed off—

"Out where the West begins."

That hombre, I reckon, is keen; he has romance in his soul, and to prove it, he filled his song with artistic touches and color and, also,

He is a booster—the kind of a booster that puts pep in every party—that makes the boys "throw up their sweaty nightcaps" and, with sheer delight yell: "E-yah! Let'r buck!"

However, I am sorry this poet did not add:

Out where the juice is a little stronger—
Out where the kilowatt's a little longer—

And all that sort of thing.

Still, I should be satisfied because he certainly boosted the West and that is my game—from the pink tipped dawn until the silent shades of evening are drawn.

He talked, you remember, of the strong sunlight—of the life giving ozone and the hearty handclaps, then wound up with a burst to high heaven about—

"Out where the West begins" and—

I contend, regardless of what my critics may say, that any section of any country, no matter how admirably it is located, needs a flock of press agents to place it and keep it on the Rand McNally.

Therefore, it is up to all of the "pards," west of the Rockies, to get to-gether, yelp to-gether and do a heap of concerted boosting in order that Our West may assume its rightful place and be favorably known throughout the length and breadth of this North American Continent.

The task of advertising the West is easier, by far, than dropping slugs in a collection box because the copy is prepared for us.

How easy it is to sing the glories of our snow-capped mountains—our purple plains—our stately forests and our fertile fields.

What an easy task to burble blessings for our roaring rivers and thundering cataracts where lies the source of millions of horsepower of electrical energy.

What a joy it is to direct the stranger's eye to our broad, deep, land-locked harbors and to the mighty ships which traffic thereon.

With what gusto can we recite the story of our wealth—potential and otherwise—the latter including eight per cent bonds and first mortgages.

With what glibness can we speak of the precious metals deep in Mother Earth's bosom, awaiting the hand of the intrepid bearded brutes who, in story

and song, come down from the mines on pay day.

And then, in the chorus of our song we can sing of the million fish, of the countless prune, of the sunkist orange and of the raisin weighted down with iron.

Verily, friends and fellow boosters, material for boosting purposes lies all about us. It is knee deep to a tall "injun" on stilts.

All we need is a soap box and an audience. And, I am reasonably assured there are thousands of folks in the corn belt who are but waiting to sit at our feet and hear us mouth the pearly words of wisdom.

But, today is the day. Now is the accepted time to begin.

Sound off that "A," Professor. Let's run over the words of:—

"Out where the West begins."

Increasing Man-Power Urged in Weekly Sales Letter

Sales letters sent out to members of sales organizations usually dwell upon the actual ways of increasing the business of the firm and fail to give any particular attention to the human element concerned. In a recent letter sent out by the Apex Electrical Distributing Company, the main topic is that of man-power. It is the avowed purpose of every organization to increase the efficiency of its men and this letter gives an idea of one of the ways in which this may be done.

The letter reads as follows:

"The energy generated by our large turbines, motors and dynamos is reckoned in 'horse-power.' The sales production of any individual organization

in the appliance business is directly proportionate to its 'man-power.'

"During 1923 we have set for ourselves the task of doubling our 1922 business. To accomplish this we have adopted the following slogan which we are going to keep before every individual in our organization this year:

**"COUNT THAT DAY LOST
WHICH HAS NOT PRODUCED
INCREASED MAN-POWER."**

"If you are a branch manager, retaining your job and expanding your job, depends absolutely on your ability to organize. If your organization is not increasing day by day you are not progressing. If you are a field manager, you cannot possibly advance yourself through individual selling. You must gather about yourself men whom you can teach and thus multiply your own sales by five, ten, fifteen or one hundred.

"But if you are an individual salesman perhaps you have the feeling that you are being paid only to sell appliances and not to interest new salesmen in this business. If you feel that way then re-adjust your thoughts. Remember that the man who never does any more than he is paid to do, remains exactly where he started.

"If man-power is the answer to this business, display your ability to interest other men. If you are sold on the position you have, tell other men about it, and bring them into the organization. If you pursue this method as an individual salesman, you will display to your manager the fact that you have a greater interest in this business than your weekly pay envelope, and will prove your right to a field manager's position very quickly.

"The best way to secure a better job is to train yourself for the position just ahead. Then you will be sure of holding it when you secure it."

Bootleg Electricity

is the quality you get when INCOMPETENT ELECTRICAL ENGINEERS have superintended the wiring and installation of electrical equipment in your home.

When electrical equipment is PROPERLY INSTALLED you can heat, clean and illuminate your home and cook all foods with much less trouble and at as low if not lower cost than by numerous other means of accomplishing the same results.

The Cox Electric Co.

have the necessary knowledge, the best of materials and the electrical mechanics and engineers WHO KNOW HOW.
Phone 565

157 Pacific Ave.

The average person knows what "Bootleg Liquor" does to the person who drinks it and advertisements of this character play upon the fear that is held against this liquor. When everyday commonplace terms that are well known to the public are used in the advertisements of the electrical contractor-dealer the force of the copy is greatly increased.

INDUSTRIAL NEWS



Power Applications Are Acted on by Federal Commission

Two preliminary permits, both covering a period of two years, have been issued by the Federal Power Commission at Washington, D. C., to Thebo, Starr and Anderton, Inc., of San Francisco, for power projects in California. One permit covers a proposed project located on the South Fork of the American River, near Placerville, which contemplates the erection of a dam 290 ft. high that would create a reservoir with a capacity of 500,000 acre-feet. A short conduit will lead from the dam to a power house on the river with an estimated installed capacity of 25,000 hp. The second permit covers a project on the McCloud River, where two dams are proposed and are planned to be located 6 and 9 miles above the mouth of the river. Plans call for the erection of power houses below each dam in which equipment is to be installed to generate 200,000 hp.

The Eureka Hydroelectric Company of Eureka, Mont., has been granted a preliminary permit to last one and one-half years, for a project which is expected to develop about 3,500 hp. on Graves Creek, Lincoln County, Montana. The power is to be used for irrigation pumping and for general utility purposes in the vicinity of Eureka.

The commission has also granted to Mrs. Anna P. Gray a preliminary permit for a period of two years, covering a project to be located on the headwaters of South Colony Creek, in Custer County, Colorado. It is proposed to develop storage on two small headwater lakes and to build three power houses on the creek. It is estimated that 1,080 hp. will be developed for use in mining properties in the vicinity and also for general utility purposes.

The commission granted an extension of time of two years to the Snow Mountain Water & Power Company in which to install additional equipment in its Potter Valley power house and to build a new power house at Scott Dam on South Eel River, in Lake County, California, and extended for one year the period of the preliminary permit issued to R. W. Hawley for power development on Silver Creek in the drainage area of the South Fork of the American River, in order to give Mr. Hawley an opportunity to assemble the data collected and to finance his project.

The commission denied the application of the Targhee Power Company for development on Warm River, in Targhee National Forest, Idaho, on account of failure of the applicants to make satisfactory showing of market for power.

Seven applications for permits or licenses have been received by the com-

mission for projects in the western states. The application covering the greatest development is that of the City of Los Angeles which applies for a preliminary permit to divert Leevining, Rush, Walker and Parker Creeks from the Mono Lake watershed through a tunnel and conduit into the Owens River drainage. It is estimated that the capacity of the Owens Gorge is approximately 40,000 hp. It is proposed to use this additional water in irrigating about 50,000 acres in the vicinity. The estimated cost is \$8,000,000. This application is in direct opposition to the application filed by the Nevada-California Power Company.

Municipal Power Sale Measure Before State Law Makers

A spirited fight is being waged in the Legislature at Olympia, Wash., over the proposed measure which will permit municipalities to sell power outside of corporate limits of cities. Several new developments have taken place in the original measure, including a recommendation by Speaker Mark E. Reed of the House that a 5 per cent tax on the gross receipts from all sales of electricity by municipalities, both inside and outside their corporate limits, be imposed, the money to go to the state as the result of power plant development.

Among the advocates of the passage of the power measure, and who spoke on behalf of it, were J. D. Ross, superintendent of the Seattle municipal light department; C. F. Uhden, chief engineer of the Skagit project; E. B. Ellington of the Parkland Power Company, Tacoma; Llewellyn Evans, superintendent of the Tacoma light plants; Ira Davisson, commissioner of light and power, Tacoma. Legal representatives of the Puget Sound Power & Light Company and of the Washington Water Power Company attacked the bill, asserting that the light and power companies are concerned, because the bill "threatens to turn loose on us an unregulated and untaxed competitor."

Directors of the Carson-Truckee (Nev.) Irrigation District have recently approved the power contract granted the Nevada Valleys Power Company by the United States Reclamation Service for a ten-year lease on the Lahontan power plant with the amendment that lower power rates be given to residents of Fallon, Nev., and the Newlands Project district. Under the agreement made by the power company it is to relinquish power rights on the Truckee River near Vista. Farmers have objected to the leasing of the Lahontan plant to the power company.

One State Has Not Ratified Colorado River Compact

All but one of the seven western states interested in the Colorado River pact, have ratified the action taken by the delegates who drew up the agreement. The legislature of Colorado is, at the time of writing, discussing the terms of the pact before accepting it. All of the states concerned must ratify the agreement before it is presented to Congress. The states which have ratified the action of their delegates are: Arizona, California, Nevada, New Mexico, Utah and Wyoming.

The pact provides for the allotment of water from the Colorado River for a period of forty years. The compact stipulates that the upper part of the Colorado River basin deliver to the lower part of the basin a total of 75,000,000 acre-feet of water within ten years. Irrigation is given priority, with power developments having rights superior to navigation interests.

Million-Volt Laboratory Is to Be Completed by March

Construction work on the high voltage laboratory at the California Institute of Technology is progressing rapidly, and it is expected that the building will be completed by the first of March. The laboratory will be used jointly by the Institute and the Southern California Edison Company.

In the laboratory will be installed a million-volt transformer to permit the electrical engineers to obtain high voltages with which they may experiment. The Edison company engineers plan to conduct high voltage and high tension tests in connection with their work in high voltage transmission. Dr. Robert A. Millikan will use the high voltage in his work on the constitution of atoms.

The million-volt transformer is one designed by Professor R. W. Sorensen, of the Institute, and will be in four units. In addition to the transformer there will be Foulson arc equipment which will be used to obtain high voltages at high frequencies.

Bids were recently opened covering a water wheel of 1,900 hp. and an alternating current generator with accessories, by the city water board of Eugene, Ore. The lowest bid, which will be accepted as soon as details are settled, calls for a Wellman-Seaver-Morgan wheel and a Westinghouse generator. It is planned to install the new unit at the present power house on the Mackenzie River, thereby increasing the plant capacity to 42,000 hp. The city is now purchasing some energy from the Mountain States Power Company. It is hoped to have the new plant running by next winter.

Utility Information Committee Formed in Washington

The Washington Committee on Public Utility Information has been organized and has opened offices in the Henry Building, Seattle, with E. H. Thomas in charge as director. The committee is organized along the lines of similar committees in other states. It repre-



E. H. Thomas, director, Washington Committee on Public Utility Information

sents the electric railways, the electric light and power companies and to a great extent the gas industry of the state.

The director, E. H. Thomas, is a newspaper man of 27 years' experience, was former managing editor of the Seattle Post-Intelligencer, and has had eight years' experience in public utility publicity work. In a statement issued by Mr. Thomas he says:

"Our committee exists to furnish accurate information and facts about our business to any citizen or group of citizens. We will prepare and send out weekly to the newspapers information about the various phases of our industry. We do this in the belief that our business with its great widespread service, which touches so very intimately the domestic, social, commercial and industrial life of the people, is a matter of concern to the public.

"The plants and properties of the companies represented by this committee are a large and important factor in the industrial organization of the state. Their aggregate assessed valuation is in excess of \$45,000,000, but, unlike other kinds of business, their gross revenues are but a fraction of that figure, less than 40 per cent, being \$19,540,000 annually. They pay more than \$1,600,000 annually in taxes, have 4,359 persons on their \$6,129,000 annual payroll, and serve a total of more than 146,000 light and power customers.

"It is a big, important and vital industry about which the public knows little or nothing. It is the belief of the men in this industry that the public is entitled to know all about the public utilities. Because of this belief this committee has been organized."

To Construct Transmission Line in Montana in Spring

Construction work on the 26-mile transmission line from Sheridan, Mont., to Dillon, Mont., will be started as soon as weather permits, according to officials of the Union Electric Company of

Dillon. The line will connect with the high voltage line of the Montana Power Company at Sheridan and will be erected for 66,000-volt operation.

Surveys and other preliminary work for the new line have been completed and plans call for the most modern equipment. The line will cost in the neighborhood of \$50,000 and is to be constructed by the Beaverhead Transmission Company, a company not connected with either the Union Electric Company or the Montana Power Company.

Dillon has been supplied by two steam-electric plants of the local power company, and the load has been increased to such a degree that it is necessary for the company to purchase power from some outside source. The high voltage current will be stepped-down in a substation to be erected in the outskirts of the city.

Power Company Will Seek Permit to Exercise Franchise

The application of the Mount Whitney Power & Electric Company for a certificate to exercise franchise rights in Kings County, Calif., will be heard by the California Railroad Commission on Feb. 23. The application of the San Joaquin Light & Power Corporation to transfer its franchise rights in Kings County to the Southern California Edison Company will be heard at the same time.

The Mount Whitney Power & Light Company's distribution system and business was purchased by the Edison company about three years ago. It has now become necessary to apply to the commission for a certificate granting the Mount Whitney company franchise rights in the county where it constructed lines, and which cannot be operated by the Edison company until the Mount Whitney company secures the right to operate them.

Twenty-five-year Service Men Are Honored at Banquet

Three hundred members of the Old Guard, an organization of employees of the Los Angeles Gas & Electric Corporation in Los Angeles, Calif., who have worked for the concern for ten years or more, were banqueted on the night of Feb. 7 as guests of the concern. G. S. Campbell, foreman of the Pasadena shop, was toastmaster; O. W. Twitchell was master of ceremonies, and Paul Overton, general counsel for the corporation, was the speaker of the evening.

W. B. Cline, president, was one of the specially honored guests, he having been with the corporation for thirty years. Some of the others who shared honors were W. M. Van Dyke, director; W. J. Dorr, superintendent of gas distribution; Horace Cline, treasurer. E. R. Northmore, superintendent of the electrical department, was admitted to the thirty-year squad and presented with a handsome pin.

The twenty-five-year men honored were: R. M. Adams and W. A. Cheney, retired; T. P. McCrea, secretary; A. B. Day, general superintendent, and C. A. Bartlett. The new twenty-five-year men admitted and presented with special pins were C. A. Luckenbach, third vice-president, and H. E. Dewey, foreman of the electric shop.

Reclamation Conference Is Held at Salt Lake City

Fourteen reclamation projects in western states, from South Dakota to the Pacific Coast, were represented in a conference of water users and reclamation service officials held at the chamber of commerce at Salt Lake City, January 29 and 30.

The conference was called at the instigation of officials of the Strawberry reclamation project in Utah, with the primary object of securing relief for water users by obtaining from the government an extension of time allowed for making water payments.

The conference was attended by thirty-five representatives of fourteen of the twenty-five projects in the territory which includes the following states: Utah, Texas, New Mexico, Arizona, California, Oregon, Washington, Idaho, Wyoming, Colorado, South Dakota, North Dakota, Nebraska, Montana and Nevada.

A permanent organization was effected, to be known as the Federated Association of United States Reclamation Project Water Users. Lee R. Taylor, of Payson, Utah, president of the Strawberry Valley Irrigation project of Utah, who presided at the conference, was elected chairman of the executive committee of the new organization.

Relief for settlers on government projects who have been unable to meet the costs of construction, maintenance and assessments now due in the form of a 40-year payment plan as provided by the Borah bill now before Congress, is the primary objective of the new association. As the Borah bill may not come before the present session of Congress in time to become a law if passed, the projects which are represented in the new association plan to appeal to the Department of the Interior and Congress for temporary relief pending the passage of the bill. An endorsement of the bill, with a suggestion that if the proposed plan depletes the reclamation fund Congress should provide a fund to the United States Reclamation Service of sufficient amount to continue the development policy, is embodied in the first resolution passed by the conference.

Another resolution claimed equitable treatment for pioneers on reclamation projects, to the end that the United States Treasury should bear the general expense of the Reclamation Service of the government, the same as other branches of the government engaged in similar work.

The Columbia Steel Corporation has recently acquired title to 3,120 acres of coal land in Carbon County, Utah, as a preliminary in making effective its program of the development of the iron industry in Utah. The property is said to contain deposits of the finest coking coal in the state.

Duplicate light and power service will be supplied to the Palouse district, in eastern Washington, by the Washington Water Power Company in the near future, when the new line from Lind to Colfax is put in service. The line from Lind east into the Palouse district will be available to supply power should the line south from Spokane fail at any time.

Oregon Power Company Bought by Stone & Webster

The Puget Sound Power & Light Company, of Seattle, a Stone & Webster subsidiary, has purchased the North Coast Power Company, which includes power and electric systems from Tenino, Wash., to Portland, Ore. This purchase, coupled with the purchase, by the company, of the Washington Coast Utilities Company recently, gives the Puget Sound Power & Light Company control of power and electric properties of western Washington, with the exception of the Grays Harbor companies and Seattle and Tacoma municipal properties.

The purchase includes street railway lines, light and power plants at Kelso and Chehalis, the electric line between Chehalis and Centralia; the light and water plants at Tenino and Kalama; the electric railway, light and water plants at Vancouver, Wash., the largest of the company's holdings; electric light and water plants at Hillsboro, Rainier, Beaverton and Forest Grove in Oregon. The company distributes electricity for light and power in all of these places and it is sold wholesale to the Centralia, Wash., municipal plant for light. The Washington Idaho Water, Light & Power Company at Winlock, Wash., purchases energy under a wholesale contract.

The North Coast Power Company operates one steam and one hydroelectric plant, the combined capacity being 2,150 kw., and purchases power from the Portland Railway Light & Power Company, the peak demand from that company being about 1,000 kw. The company, as the Washington Coast Utilities, will continue to operate under the same name and with the same organization as before the purchase.

National Commission Favored to Regulate Broadcasting

With the idea in view of greatly expanding the usefulness of radio telephone broadcasting, H. P. Davis, vice-president of the Westinghouse Electric & Manufacturing Company, has suggested a plan for the establishment of a national broadcasting service.

Mr. Davis thinks that a federal regulating commission should be formed to control broadcasting. This commission, he believes, should be vested with full power and authority to make regulations and enforce them to the full extent of existing laws. It is Mr. Davis' contention that all requests for licenses should come to and be approved by this body, and when an application for a license is approved and the license given, it should take on the nature of a franchise which should be enjoyed by the owner so long as he gives the service required.

Mr. Davis suggests that there must be two classes of broadcasting stations, and these two classes ought to be sufficient. First, there will be stations that are national in scope—broadcasting material of national interest and second, local stations serving particular districts. A plan of this kind can be worked out and would, in his opinion, permit the widest possible use and development of broadcasting. The service of the local stations would allow crystal set reception of distant national stations through the relaying of their

programs by the local station. On the other hand, it would not prevent those having suitable receiving sets, selecting programs at will of such of the national stations as they could receive. The privilege of operating a radio receiving set shall be subject to such rules and restrictions as the interstate radio commission, acting in the interest of the public, may find it desirable to enforce, according to Mr. Davis.

The British Columbia Electric Railway Company has let a contract for the construction of the distributing system in the municipality of West Vancouver to Hume & Rumble, of New Westminster, for \$40,000. The work calls for the erection of some 800 standard poles and the stringing of about 15 miles of wire. It is expected that the work will be completed in about six weeks' time.

Second Electric Ferry Launched on San Francisco Bay

The second electrically operated ferry boat built for the Golden Gate Ferry Company, of San Francisco, was launched from the Robertson Shipyards at Alameda, Calif., on Feb. 3. The new ferry will be completed as quickly as is possible and the shipbuilding concern will endeavor to have it ready for operation in May.

The boat will be primarily for handling automobiles between San Francisco and Sausalito. The capacity of the new vessel will be eighty cars and when it is put in service the company will be able to maintain a fifteen-minute service on holidays and a thirty-minute schedule on week days.

Miss Elizabeth Klatt, daughter of the secretary-treasurer of the Golden Gate Ferry Company, christened the boat the "Golden West." The "Golden Gate," sister ship of the "Golden West," is the only electrically propelled ferry boat operating on San Francisco Bay at the present time, but the San Francisco Oakland Terminal Railways Company is having two built which should be in service before the end of the year.

California Cooperative Campaign Sets Budget for 1923

Budget requirements for the enlarged program which will be undertaken by the California Electrical Cooperative Campaign during 1923 were outlined at a meeting of the Advisory Committee of that organization held at Del Monte Feb. 7. During the year a total of \$50,000 will be expended in California in a concentrated effort to educate the public to a greater per capita use of electricity. At the same time a preliminary budget of \$65,000 for the year 1924 was decided upon.

The budget for this year will be guaranteed by contributions of \$30,000 from the central station group and \$20,000 from the manufacturer, jobber, contractor-dealer group. A new field for contributions has been opened up in the recognition by the campaign of the broadest channels of distribution for electrical appliances. Subscriptions from such retailers will be credited to the central station allotment.

Plans of campaign activities for the coming year include the display of ten electrical homes, construction on four of which is under way at the present time. These four homes will be on display in Long Beach, Fresno, San Francisco and San Diego within the next few months. Five illuminated billboards and other special undertakings along educational lines will be widely distributed over the state. The campaign staff will be enlarged by the addition of six field representatives, two of whom will be women lecturer-demonstrators.

An application has been received by J. P. Martin of Ogden, Utah, district engineer of district four of the Forest Service, from the Nevada Power Company, a subsidiary of the Idaho Power Company, for license to construct a power transmission line through the Humboldt National Forest to supply additional mines in the Jarbidge mining district at Jarbidge, Nev. The application will be referred to the federal power commission at Washington.



Launching of the "Golden West," the second electrical ferry for San Francisco Bay.

Twenty-five Year Service Button Given John B. Miller

In commemoration of twenty-five years' service, a complimentary dinner was given to John B. Miller, president of Southern California Edison Company, by the officials and employees of that company on Feb. 1, at the Hotel Alexandria, Los Angeles. During the evening the twenty-five year service button, the highest in a series given every five years, was bestowed upon



JOHN B. MILLER,
President, Southern California Edison Co.

Mr. Miller, sixteen employees who have achieved the twenty-five year rank serving as guard of honor. In 1898, when Mr. Miller joined the Edison organization, there were only twenty-nine employees and the annual gross earnings were less than \$50,000. There are now five thousand employees and the gross revenues exceed \$17,000,000 a year. The present vice-president and general manager, R. H. Ballard, was then the only bookkeeper and W. L. Percey, now treasurer, was the cashier when Mr. Miller joined the company.

In the course of the evening complimentary telegrams arrived from Thomas A. Edison, Samuel Insull, president of Commonwealth Edison Company, Chicago; Joseph B. McCall, Philadelphia Electric Company; Frank W. Smith, president National Electric Light Association; Mortimer Fleishacker, president Great Western Power Company of San Francisco; W. E. Creed and John A. Britton of Pacific Gas & Electric Company, San Francisco; S. Z. Mitchell, president Electric Bond & Share Company, New York; C. L. Edgar, president Edison Electric Illuminating Company of Boston; H. M. Byllesby, president H. M. Byllesby Company, Chicago; Albert Harris, president Harris Trust & Savings Bank, Chicago; E. W. Rollins of E. H. Rollins & Sons, Boston; James H. McGraw of McGraw-Hill Publishing Company, New York; Franklin T. Griffith, president Portland Railway, Light & Power Company, and Daniel E. Pomeroy, Bankers Trust Company of New York.

Brief talks were given by R. H. Ballard, vice-president and general manager; S. H. Kennedy and G. C. Ward,

vice-presidents; George I. Cochran and Henry M. Robinson, directors; R. V. Reppy, general counsel; B. F. Pearson, manager of operations, and W. A. Raymaker, field superintendent of construction. These men have been associated with Mr. Miller for many years and the occasion proved as delightful to them as to their president.

The program was concluded by presenting Mr. Miller with a painting entitled "Spring in the Desert," by John M. Gamble, a gift from the officers and men of the Edison company.

Annual Report Is Published by British Columbia League

In the second annual report of the Electrical Service League of British Columbia, which has recently been published, the activities of the league during the last year have been reviewed and plans for the coming year have been outlined. The report includes statements concerning the finances of the league as well as a summation of the activities of the league among the public and its members.

The outlook for the future includes a statement that the object of the league will be the same as at the beginning, namely, educational, but the problems are to some extent changing. The report claims that it will be necessary to devote more time to promoting the electrical idea among the members of the industry as well as among the public.

Los Angeles Railway Will Build Its Own Street Cars

The Los Angeles Railway Company will build its own cars in a shop under construction at the intersection of Fifty-third Street and South Park Avenue. The new shop is to be 433 ft. long and 94 ft. wide, with twenty-one tracks accommodating forty-two cars.

Material for the first cars to be constructed has been ordered and actual work will be started in about three months. Plans call for the construction of a type of car almost the same as that used in the two-car trains on the Grand-Moneta Avenues line and the Western Avenue line.

About five hundred employees of the Denver Gas & Electric Light Company, members of the Doherty Men's fraternity, were present at a banquet given in Denver, Colo., on Feb. 1, to hear the message from Henry L. Doherty, president of the interests which control the Denver company. Clare N. Stannard, general manager of the Denver Gas & Electric Light Company, was the principal speaker and told the men of Mr. Doherty's feelings toward the Colorado companies under his control.

A rehearing was granted by the California Railroad Commission in the application of the Great Western Power Company for an increase of rates, upon petition of the San Francisco-Sacramento Railway Company and the San Francisco-Oakland Terminal Railways. The applicants contended that the recent order of the commission fixing rates for the Great Western Power Company is prejudicial to their rights and interests. The hearing will be held Feb. 21.

Will Increase Capacity of Snake River Generating Plant

That it may be prepared to handle the increased load which will fall on the power house on the east side of the Snake River at American Falls, Idaho, should the company turn the other two plants over to the Reclamation Service, the Idaho Power Company is starting the enlargement of the east side plant. New generating equipment will be added which will increase the capacity of the east side unit by 16,000 hp.

The Reclamation Service is considering the erection of a large dam to provide a reservoir for irrigation purposes and should this dam be placed the power houses in the middle and on the west side of the river will have to be turned over to the Reclamation Service engineers. The power company is preparing to stand the additional load which will fall on the east side plant by installing the two 9,000-hp. turbines and two 8,000-hp. generators.

Provisions for housing the men who will work on the addition have already been made and actual construction should commence in the near future. Between 75 and 150 men will be employed on the job that it may be completed as quickly as possible.

Bids on New Building Accepted by Fresno Corporation

Bids for the new ten-story office building to be erected for the San Joaquin Light & Power Corporation at Fresno, Calif., have been approved and adopted by the directors of the company. The building will house all of the offices of the company.

The successful bidders are: reinforcing steel, Kyle & Company, Fresno; structural steel, Pacific Rolling Mills, San Francisco; glass and glazing, Tyre Brothers, Fresno; millwork, Fresno Planing Mill, Fresno; plaster, MacGruer & Simpson, San Francisco; plumbing, Luppen & Hawley, Sacramento; marble, Hilgarten Marble Company, Los Angeles; tile, Fresno Marble & Tile Company, Fresno; sheet metal, Standard Sheet Metal Works, Fresno; composition roofing, Valley Lumber Company, Fresno; tile roofing, C. E. McMullen, Fresno; painting, Joseph Streeter, Fresno; sprinklers, Pacific Fire Extinguisher Co., San Francisco; cement, Riverside Portland Cement Co., Riverside; metal windows, U. S. Metal Products, San Francisco.

An additional appropriation of \$300,000 was also voted by the directors for the installation of industrial yards at Orange and California Avenues in Fresno. The yards will occupy a tract of sixty-three acres adjoining the Sanger branch of the Southern Pacific. The immediate construction program calls for a transformer warehouse, a salvage warehouse, general store rooms, meter testing and transformer testing departments, a pole treating plant, a dipping plant and a crossarm mill.

The budget for the year includes an item for \$350,000, for the additions and betterments to the water system of Fresno. New pipe will be laid in many places, and the company will endeavor to get city blocks to cooperate in installing sprinkler systems, as by placing the systems in full blocks the work can be done cheaper.

Meetings

Reflections from the N.E.L.A. Denver Sections Meeting

Four ladies were in attendance—Mrs. O. R. Hogue and Mrs. F. R. Jenkins of Chicago, Mrs. William E. Clement of New Orleans and Mrs. O. H. Caldwell of New York City. They were entertained by Mrs. R. G. Gentry, wife of the commercial manager of the central station in Denver.

C. E. Greenwood of the Edison Electric Illuminating Company of Boston, W. R. Powers of the Consolidated Light, Heat & Power Company of Huntington, W. Va., and A. M. Frost of the San Joaquin Light & Power Corporation of Fresno, Calif., were on the sick list during the sessions.

The personnel of the committee which arranged the meetings and entertainment was as follows: V. L. Board, general superintendent, Harry Hughes, treasurer, and F. F. McCammon, power sales engineer, all of the Denver Gas & Electric Light Company; G. E. Lewis of the Rocky Mountain Committee on Public Utility Information; and S. W. Bishop, executive manager of the Electrical Cooperative League in Denver.

California cheer was dispensed at the banquet by A. M. Frost of Fresno and D. C. Ray and H. E. Sandoval of the Pacific Gas & Electric Company, San Francisco, in the form of raisins in little individual packages.

L. M. Cargo, Rocky Mountain manager for the Westinghouse Electric & Manufacturing Company, was host to about twenty of the visitors at a dinner at the Metropole Hotel preceding the Harry Lauder theater party.

The wide out-of-doors of the West appealed strongly to G. Bertram Regar, chairman of the lighting sales bureau and a native of Philadelphia. It was his first trip West and as a result Colorado has another booster.

Clare N. Stannard, vice-president and general manager of the Denver Gas & Electric Light Company, and one of the leaders in the movement to place the commercial section meeting in Denver and who sponsored the entertainment program provided for the visitors, could not be present because of a detention in New York where he had been called in conference with Henry L. Doherty.

George F. Oxley, director of publicity for the N.E.L.A., was in Denver at the time of the meetings but the old home town looked too good to George to let a little business stand in the way. Besides, George said he was on a vacation.

A. W. Childs of the Southern California Edison Company addressed the Denver Electrical Cooperative League meeting Jan. 24, when all the N.E.L.A. visitors were guests.

Several people asked if the banquet Jan. 25 was a Westinghouse convention. Maybe it was, for there were somewhere between twenty and thirty of the company men in attendance most of the time.

Registration at the N.E.L.A. Section Meetings in Denver, Colo., Jan. 24-26

Addie, C. E., Denver Gas & Electric Light Co., Denver, Colo.
 Adler, Harry, Arapahoe Electric Light & Power Co., Denver, Colo.
 Anderson, A. S., General Electric Co., Denver, Colo.
 Ball, E. B., Western Light & Power Co., Boulder, Colo.
 Baylor, A. K., General Electric Co., New York City
 Berry, A. F., U. S. Electric Light & Power Co., New York City
 Bigler, C. A., Denver Gas & Electric Light Co., Denver, Colo.
 Bleak, R. M., Utah Power & Light Co., Salt Lake City
 Bridger, L. J., Westinghouse Electric & Manufacturing Co., Denver, Colo.
 Brierley, G. Cecil, Western Light & Power Co., Boulder, Colo.
 Byrne, W. S., Nebraska Power Co., Omaha, Neb.
 Caldwell, O. H., "Electrical Merchandising," New York City
 Chase, Samuel Adams, Westinghouse Electric & Manufacturing Co., New York City
 Childs, A. W., Southern California Edison Co., Los Angeles, Cal.
 Clark, R. W., Puget Sound Light & Power Co., Seattle, Wash.
 Clement, Wm. E., New Orleans Public Service Co., New Orleans
 Cody, L. W., Western Light & Power Co., Boulder, Colo.
 Coe, E. H., Colorado Power Co., Denver, Colo.
 Cooper, John J., Mountain Electric Co., Denver, Colo.
 Cox, J. R., N. Y. & Queens Electric Light & Power Co., Long Island City
 Crites, O. E., Southern Colorado Power Co., Pueblo, Colo.
 Crowe, J. J., Automatic Electric Washer Co., Newton, Iowa
 Cummings, C. A., Duncan Electric Manufacturing Co., Lafayette, Ind.
 Dostal, J. F., Colorado Springs Light, Heat & Power Co., Colorado Springs, Colo.
 Douden, P. A., Western Electric Co., Denver, Colo.
 Dunten, C. O., Central Illinois Public Service Co., Springfield, Ill.
 Edkins, E. A., Commonwealth Edison Co., Chicago
 Fagan, Walter, Chicago Flexible Shaft Co., Chicago
 Fitzsimons, T. E., Westinghouse Electric & Manufacturing Co., Denver, Colo.
 Frazier, E. H., Delco-Light Co., Denver, Colo.
 Frost, A. M., San Joaquin Light & Power Corp., Fresno
 Gavette, E. L., Western Light & Power Co., Loveland, Colo.
 Gentry, R. G., Denver Gas & Electric Light Co., Denver, Colo.
 Goldman, A., New York Edison Co., New York City
 Goodwin, William L., Society for Electrical Development, New York City
 Greenwood, C. E., Edison Illuminating Co., Boston
 Groo, Jay S., Northwestern Electric Co., Portland, Ore.
 Hale, R. S., Boston Edison Electric Co., Boston
 Harvey, J. L., Kansas Gas & Electric Co., Wichita, Kans.
 Heston, Walter C., "Electrical World," San Francisco
 Hodgson, G. O., General Electric Co., Denver, Colo.
 Hogue, O. R., Commonwealth Edison Co., Chicago
 Hughes, George A., Edison Electric Appliance Co., Chicago
 Jenkins, Fred R., Commonwealth Edison Co., Chicago
 Jacobs, E. R., Simplex Electric Heating Co., Chicago
 Kennedy, Thomas F., Doherty Co., New York City
 Kirk, J. J., Commonwealth Edison Co., Chicago
 Kirk, O. G., Home Gas & Electric Co., Greeley, Colo.
 Lane, H. A., National Electric Light Association, New York City
 Lanning, M. E., Westinghouse Electric & Manufacturing Co., Denver, Colo.
 Laufenburg, W. J., Western Electric Co., Denver, Colo.
 Lester, Bernard, Westinghouse Electric & Manufacturing Co., East Pittsburgh
 Looney, J. E., Home Gas & Electric Co., Greeley, Colo.
 Lufkin, J. L., U. S. Electric Light & Power Co., New York City
 Luskomb, H. T., New York Edison Co., New York City
 McCammon, F. F., Denver Gas & Electric Light Co., Denver, Colo.
 McGrath, Thomas, Arapahoe Electric Light & Power Co., Littleton, Colo.
 Meese, Horace S., Commercial Truck Co., Philadelphia
 Meyer, H. W., N. W. States Power Co., Minneapolis
 Miller, G. E., Cleveland Illuminating Co., Cleveland, Ohio
 Milliken, E. L., Stone & Webster, Woonsocket, R. I.
 Morrow, M. C., Westinghouse Electric & Manufacturing Co., New York City
 Moser, W. A., Westinghouse Electric & Manufacturing Co., Salt Lake City
 Nichols, C. K., New York Edison Co., New York City
 Norcross, Fred, Home Gas & Electric Co., Greeley, Colo.
 Orr, J. F., Idaho Power Co., Boise, Idaho
 Pembleton, F. D., Public Service Co., Newark, N. J.
 Power, W. R., Consolidated Light, Heat & Power Co., Huntington, W. Va.
 Pragst, Ernest, General Electric Co., Schenectady
 Putnam, W. R., Idaho Power Co., Boise, Idaho
 Quinn, John F., Colorado Power Co., Denver, Colo.
 Randall, H. D., General Electric Co., Denver, Colo.
 Ray, D. C., Pacific Gas & Electric Co., San Francisco
 Reagan, H. C., Western Light & Power Co., Boulder, Colo.
 Regar, G. Bertram, Philadelphia Electric Co., Philadelphia
 Roche, J. F., Edison Electric Appliance Co., Chicago
 Rowland, E. M., Western Light & Power Co., Boulder, Colo.
 Rowley, B. E., Edison Electric Appliance Co., Salt Lake City
 Sanborn, R. P., Edison Storage Battery Co., Orange, N. J.
 Sandoval, H. E., Pacific Gas & Electric Co., San Francisco
 Semrad, C. A., Western Light & Power Co., Boulder, Colo.
 Skinner, Charles R., Jr., New York Edison Co., New York City
 Spake, L. C., Electric Light & Power Co., Chicago
 Sprunt, Jr., J. P., Westinghouse Electric & Manufacturing Co., Denver, Colo.
 Stearns, J. W., Mountain Electric Co., Denver, Colo.
 Stone, E. F., Southern Colorado Power Co., Pueblo, Colo.
 Storey, L. R., Home Gas & Electric Co., Greeley, Colo.
 Strange, John V., Pacific Power & Light Co., Portland, Ore.
 Tallman, Vernon M. F., Chas. H. Tenney & Co., Boston
 Thomas, G. W., Western Light & Power Co., Boulder, Colo.
 Vogler, Frank J., Colorado Springs Light, Heat & Power Co., Colorado Springs
 Walker, H. S., Westinghouse Electric & Manufacturing Co., Denver, Colo.
 Wilcox, N. T., Mississippi River Power Co., Keokuk, Iowa
 Wright, Harold, Commonwealth Edison Co., Chicago

Pacific Coast Supply Jobbers Hold Quarterly Meeting

The quarterly meeting of the Pacific Division of the national Electric Supply Jobbers' Association, held at Del Monte, Calif., Feb. 8-10, was the largest meeting which the records of the association show. The meetings, which were in charge of Chairman C. E. Wiggin, were well attended and were productive of much interesting discussion. With the exception of three members of the association, every firm was represented. Aside from the jobbers, an unusually large registration of manufacturers and representatives of other electrical interests were in attendance.

N. W. Graham, of the Graham Reynolds Electric Company, of Los Angeles, was elected chairman of the division and A. H. Elliot was re-elected secretary. E. G. Alexander, of Alexander & Lavenson, Los Angeles, was elected as the new delegate to the executive committee of the Pacific Coast Division. During the entire time that the convention was in session, Thomas M. Debevoise, general counsel of the association, was in attendance.

The open meeting of Feb. 10 was in charge of E. O. Shreve, San Francisco manager of the General Electric Company, and proved to be one of the most interesting and instructive meetings ever held by the association. The first speaker, R. A. Balzari, Westinghouse Electric & Manufacturing Company, chose as his subject "Business Courtesy," and impressed upon his audience the necessity of the proper observance of courteous practices in dealing with the public.

W. R. Alberger, vice-president and general manager, San Francisco-Oakland Terminal Railways, addressed the meeting on the problems of the electric railway business. Mr. Alberger chose as an example for his talk, the operation of the company of which he is executive head.

The principal discussion of the meeting centered around a chart designed and presented by E. O. Shreve, describing a proposed co-ordination of the different electrical clubs, leagues and societies to promote a greater solidarity of interest in the mutual problems of public utilities, with particular reference to their bearing upon the electrical industry.

Much enthusiasm was displayed in connection with the golf tournaments which are a regular feature of the quarterly meetings. An innovation in the form of a "Calcutta Pool" was introduced, whereby the contestants were auctioned off. Ten prizes were awarded for those making the lowest net score in two days' play, prizes going to purchasers of the winning players. In the contest for the cups, which are also regularly awarded, C. B. Hall, Illinois Electric Company, Los Angeles, was successful in winning both the Turner trophy and the "Old Copper Cup" for the lowest net score. The Deming trophy was won by George A. Boring, district manager, Pacific States Electric Company, Portland. The winners of the Calcutta Pool and their purchasers were as follows:

First place, H. L. Garbutt, Westinghouse Electric & Manufacturing Company, San Francisco, owned by T. E. Bibbins, Pacific States Electric Com-

pany, San Francisco; second place, C. P. Bach, Manhattan Electrical Supply Company, San Francisco, owned by F. N. Averill, Fobes Supply Company, Portland, Ore.; third place, C. M. Will, Fobes Supply Company, Portland, Ore., owned by F. N. Averill; C. B. Hall, Illinois Electric Company, Los Angeles, Calif., and N. S. Gallison, Journal of Electricity and Western Industry, San Francisco, tied for fourth place, their respective owners, F. J. Airey, Pacific States Electric Company, Los Angeles, and D. E. Harris, Pacific States Electric Company, San Francisco, matched for the position and as a result Mr. Hall's owner received the fourth prize; sixth place was won by G. A. Boring, Pacific States Electric Company, Portland, owned by T. E. Bibbins; seventh place went to C. C. Hillis, Electric Appliance Company, San Francisco, owned first by P. E. Booth, Edison Electric Appliance Company, Ontario, Calif., but sold to Mrs. C. C. Hillis. H. W. Turner, Montana Electric Company, Butte, Mont., owned by W. S. Berry, Western Electric Company, San Francisco, won eighth place; W. S. Berry, owned by E. G. Alexander, Alexander & Lavenson Company, Los Angeles, J. I. Colwell, Western Electric Company, Seattle, Wash., owned by P. E. Booth, and Garnett Young, Garnett Young & Company, San Francisco, owned by Miles F. Steel, Benjamin Electric Company, San Francisco, tied for ninth place.

The following were in attendance at the golf dinner, which was the final event of the three-day session:

P. J. Aaron, N. Abrams, F. J. Airey, W. R. Alberger, E. G. Alexander, H. W. Allen, R. M. Alvord, S. B. Anderson, F. N. Averill, C. P. Bach, George Bailey, R. A. Balzari, H. L. Bargion, J. D. Barnhill, F. Beck, W. S. Berry, T. E. Bibbins, G. A. Boring, J. L. Busey, A. J. Calloway, J. O. Case, S. A. Chase, J. I. Colwell, H. H. Daley, L. W. Davis, A. H. Elliot, C. W. Fritz, N. S. Gallison, H. L. Garbutt, Eugene Garcia, F. A. Gearhart, C. W. Goodwin, G. A. Gray, W. S. Greenfield, S. B. Gregory, C. B. Hall, D. E. Harris, C. B. Hawley, W. C. Heston, C. C. Hillis, G. E. Hillis, E. E. Himmel, Ben Holst, R. J. Holterman, J. Kahn, James Kearney, J. L. Kline, A. Kohn, J. H. Lavenson, C. E. Listenwaller, August Lutz, W. D. McDonald, E. P. Markee, H. J. Martin, A. R. Miller, H. R. Noack, R. F. Oakes, S. W. Peterson, J. G. Pomeroy, H. F. Rea, C. D. Russell, H. E. Sanderson, W. B. Sawyer, E. O. Shreve, M. F. Steel, H. B. Squires, C. E. Thompson, F. C. Todt, H. W. Turner, C. E. Wiggin, C. M. Will, Roy Worth, and Garnett Young.

COMING EVENTS

American Society of Mechanical Engineers—
Pac. Coast Regional Meeting—Los Angeles, Calif.
Apr. 16-18, 1923

National Electric Light Association—
Annual Convention—New York, N. Y.
June 4-8, 1923

Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923

American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Sept. 26-29, 1923

Engineers Completing Plans for Pacific Coast Meeting

Preliminary plans for the Pacific Coast convention of the American Institute of Electrical Engineers have recently been rounded into nearly definite shape. The convention is to be held at Del Monte, Calif., Sept. 26-29.

One of the most important things to be done will be the presenting of the Edison Medal to Dr. Robert A. Millikan. Symposiums of nine technical papers will be presented at the three morning sessions of the convention and opportunities will be given the visiting engineers to discuss problems of the electrical industry.

Afternoons will be devoted entirely to recreation. A special train will leave Del Monte the last day of the convention, which will take the engineers to visit the Hetch Hetchy project of the City of San Francisco.

San Francisco Electrical League Elects New Officers

Louis F. Leurey, consulting electrical engineer of San Francisco, was elected president of the San Francisco Electrical Development League at the annual election meeting held Feb. 12. During the past year Mr. Leurey has been chairman of the entertainment committee.

The present secretary-treasurer, J. W. Mahoney, of the General Electric Company in that city, was re-elected by the members of the league. A. U. Brandt, electrical engineer, San Francisco division of the Pacific Gas & Electric Company; D. I. Cone, protection engineer of the Pacific Telephone & Telegraph Company, San Francisco; and C. Todt, Pacific States Electric Company, were named as the new members of the executive committee of the electrical association.

Electrical Men Discuss Future Growth of Industry

Samuel Adams Chase, special representative of the merchandising department of the Westinghouse Electric & Manufacturing Company of New York City, was the guest of the electrical fraternity of Salt Lake City, Wash., at their monthly meeting on the evening of Jan. 30. This meeting was one of the first of a series of monthly meetings to be held by the electrical interests, under the auspices of the Rocky Mountain Electrical Cooperative League.

Mr. Chase, in a very interesting talk, produced some figures showing the past growth and future prospective growth of the electrical industry, and the very large field that has hardly been touched in the electrical merchandising division. Mr. Chase is an ardent supporter of the electrical cooperative idea, and is doing excellent work in bringing a closer association among all branches of the industry.

Lafayette Hanchett, president of the Utah Power & Light Company, also spoke on the subject of the future of the electrical pump on the farm. Mr. Hanchett presented some exceedingly interesting data.

The subject of better lighting was covered in a very able manner by Mr. Mills, western representative of the National X-Ray Reflector Company.

Personals

Charles P. Dunn, formerly connected with the City of Seattle's Skagit development in the capacity of hydraulic and structural designer, has become head of the drafting department of the Port-



CHARLES P. DUNN

land Railway, Light & Power Company. Mr. Dunn received his early training at Washington State College, and for the ten years prior to his connection with the City of Seattle, he was associated with the western district of the Great Northern Railway. His time was spent largely in connection with the hydro-electric development involved in the electrification of the Cascade tunnel. During the period of the war Mr. Dunn was employed by the Skinner and Eddy Corporation of Seattle in charge of hull design. His new work in Portland will deal principally with the construction of the 30,000-kva. Oak Grove develop-

A. J. Calloway, manager of the Western Electric Company, J. A. Kahn, Capitol Electric Company, and C. B. Hawley, Intermountain Electric Company, were the Salt Lake delegates to the jobbers' meetings at Del Monte. Mr. Kahn was toastmaster at the golf dinner.

H. L. Bargion, H. W. Turner and J. L. Busey of the Montana Electric Supply Company, Butte, were the Montana delegates to the recent Del Monte jobbers' meetings.

Harry C. Goldrick, who for a number of years has been manager of the Syracuse office of the Western Electric Company, has been transferred to the Los Angeles office to take charge of the electric household appliance department. Mr. Goldrick, who was formerly located on the Pacific Coast, will take up his new duties immediately.

W. W. Campbell, director of the Lick Observatory and a scientist of note, has been appointed to the presidency of the University of California by the Board of Regents of that institution. Dr. Campbell is a noted astronomist and has been connected with the University since 1891. He is a graduate of the University of Michigan with a degree in civil engineering.

Harry L. Harper, manager of the Western Electric Company, K. E. Van Kuran, manager of the Westinghouse Electric & Manufacturing Company, and J. O. Case, manager of the General Electric Company, were among the Los Angeles electrical men to attend the recent Del Monte convention of the Pacific Coast division of the National Electrical Supply Jobbers' Association. Others included in the Los Angeles delegation to the convention were H. W. Allen, sales manager, Graham-Reynolds Electric Company; J. L. Kline, president, Western Light & Fixture Company; Frank J. Airey, manager, Pacific States Electric Company; C. E. Listenwaller, Listenwaller & Gough; C. B. Hall, president, Illinois Electric Company; E. P. Markee, district manager, Edison Lamp Works of the General Electric Company; L. W. Davis, manager, Westinghouse Lamp Company; J. G. Pomeroy, district representative, Rome Wire Company; P. H. Booth, manager, Edison Electric Appliance Company, and J. H. Jamison, manager, merchandising department, Westinghouse Electric & Manufacturing Company.

Samuel A. Chase, special representative of the merchandising department of the Westinghouse Electric & Manufacturing Company with offices in New York, is making a tour of the West in the interests of his company. Mr. Chase attended the meetings of the commercial national section of the N.E.L.A. in Denver and later addressed a meeting of the Rocky Mountain Electrical Co-operative League. He also attended the Del Monte meeting of the Pacific Coast division of the National Electrical Supply Jobbers' Association. Mr. Chase is one of the best known figures in the electrical industry in the country and one of the foremost authorities on merchandising problems.

George Bailey, of the Westinghouse Commercial Investment Company, New York City, recently completed a tour of the Pacific Coast. Mr. Bailey also attended the quarterly meeting of the Pacific Coast division of the National Electrical Supply Jobbers' Association at Del Monte.

J. I. Colwell, manager of the Seattle office of the Western Electric Company, Roy Worth, district manager, and C. D. Russell, sales manager, Pacific States Electric Company, Seattle, P. J. Aaron, manager, Fobes Supply Company, Seattle, W. D. McDonald, district manager, Westinghouse Electric & Manufacturing Company, Seattle, H. J. Martin, National Carbon Company, Seattle, George Boring, manager, Pacific States Electric Company, Portland, C. M. Will, manager, Fobes Supply Company, Portland, and S. W. Peterson, Stubbs Electric Company, Portland, were among the men from the Northwest who attended the recent meeting of the Pacific Coast division of the National Electrical Supply Jobbers' Association at Del Monte. Mr. Boring was the winner of the Deming trophy in the golf tournament which is a regular feature of the meetings.

Ira Osborn Baker, professor of civil engineering, emeritus, University of Illinois, was the guest of honor of the San Francisco Engineers' Club on Feb. 2, 1923. He addressed the members of the organization on "The Future Status of Engineers."

Kenneth A. McIntyre, of the staff of the Society for Electrical Development, will spend Feb. 12-14 in Denver where he will speak before a meeting of members of the electrical industry. The visit is in connection with a trip which Mr. McIntyre is making through the Middle West.

L. J. Moore, executive engineer of the San Joaquin Light & Power Corporation, is in New York attending the sessions of the technical section of the National Electric Light Association. Mr. Moore will remain in the East about a month and will visit the factories of various electrical manufacturers before returning to his headquarters in Fresno.

W. E. Sprackling, general manager of the Tubular Woven Fabric Company, Pawtucket, R. I., is a recent Pacific Pacific Coast visitor.

A. M. Frost, manager of sales of the San Joaquin Light & Power Corporation, and C. C. Courtright, manager of the Valley Electric Supply Company of Fresno, attended the meetings of the commercial section of the National Electric Light Association in Denver during the latter part of January.

Ray Y. Muffley, for many years light and power superintendent of the Puget Sound Light & Power Company at Bellingham, Wash., has been named general manager of the Washington Coast Utilities branch of the company with headquarters in Seattle. The properties of the Washington Coast Utilities were recently taken over by the Puget Sound company.

G. C. LaMarsna, electrical superintendent of the Honolulu Consolidated Oil Company of Taft, is a Los Angeles visitor.

Burton R. Stare, of the Burton R. Stare Electric Company, Seattle, is one of the most active members of the Electric Club of Seattle engaged in arranging for the Electrical Show which is to be staged in that city within the next two or three months. The Elec-



BURTON R. STARE

tric Club, which recently displayed two highly successful electric homes, is sponsoring the exposition. Dealers, jobbers and manufacturers are co-operating to make the coming show a success. During the electric home display, Mr. Stare acted as general chairman for the homes, supervising the exhibition of both the Mt. Baker and the North Broadway model houses.

R. M. Bleak of the Utah Light & Power Company has been re-elected secretary-treasurer of the Rocky Mountain Electrical Cooperative League for the coming year. Mr. Bleak has charge of the lighting and appliance sales of that company and has been a member of the commercial department for the past seven years. He is an enthusiastic supporter of the principles of the Cooperative League and has been one of its most active members since the in-



R. M. BLEAK

ception of the organization. He is an active worker for cooperation among the various branches of the electrical industry.

Chas. E. Johnson, district illuminating engineer, Westinghouse Electric and Manufacturing Company of Los Angeles, is now in the East visiting the Geo. Cutter Works of the Westinghouse Company at South Bend, and the Westinghouse Lamp Works at East Orange, New Jersey.

F. N. Averill, president of the Fobes Supply Company, of Portland, was one of the Northwestern representatives at the recent Del Monte meeting of the Pacific Coast section of the National Electrical Supply Jobbers' Association.

R. R. Wyker of the Los Angeles office of the Pacific States Electric Company, has been made resident agent for Arizona for the company with headquarters in Phoenix.

Franklin T. Griffith, president of the Portland Railway, Light & Power Company, has been named a member of the general publicity committee of the American Electric Railway Association. W. P. Strandborg, publicity agent of the same company, has been reappointed to the sub-committee on publicity which is in charge of the district made up of Oregon, Washington, Idaho, Montana, Wyoming, North and South Dakota.

Stanley Walton, for thirteen years a member of the commercial department of the Pacific Gas & Electric Company, and until recently sales manager of the gas and electric departments, has resigned to become sales manager of the Bonestell Paper Company, one of the pioneer firms in the paper business in San Francisco. Mr. Walton was a member of the class of 1904 of the University of California.

Arthur Prager, manager of the Albuquerque (N. M.) Gas & Electric Company, has been elected president of the Albuquerque Chamber of Commerce.

A. Strauch, formerly electric heating specialist for the Pacific Gas & Electric Company, has opened offices in the Rialto Bldg., San Francisco, as an electric heating engineer. Mr. Strauch is prepared to submit estimates and furnish apparatus for domestic and industrial electric heating, cooking and refrigeration. Mr. Strauch was in charge of the development of electric heating and cooking for the Pacific Gas & Electric Company for eight years.

K. W. Kissick, for the past two and a half years with the Sheridan County Electric Company as chief engineer, has been appointed manager of the Deming Ice & Electric Company of Deming, N. M. Mr. Kissick succeeds R. E. Thompson, who resigned to become manager of the Springfield (Mo.) Gas & Electric Company.

Jack Flester, formerly with the Idaho Power Company at Pocatello, has joined the Salt Lake City office of the Edison Electric Appliance Company as range sales specialist.

J. L. Stannard, of San Francisco, has been named chief engineer for the construction of the first unit of the City of Tacoma's new \$5,000,000 Lake Cushman power project. Mr. Stannard is familiar with the Lake Cushman power project, having in 1917 prepared complete plans and estimates for the development, at the time when the City of Seattle called for bids on the Lake Cushman project, before the Skagit power project had been undertaken.

J. Fischer, veteran electrical engineer and contractor, was elected president of the Denver Association of Electrical Contractors and Dealers at the annual election held by that organization Jan. 23. E. A. Scott was chosen vice-president and H. Alex Hibbard, a Denver manufacturer's representative, as secretary and treasurer. All three officers are members of the advisory board of the Electrical Cooperative League in that city. Chairmen of the various divisions were appointed as follows: fixtures, Charles N. Shannon; wiring, P. Harry Byrne; motors, Basil Swank; and appliances, Henry Cahn. The entertainment committee consisting of J. W. Hancock, chairman, Theodore Nollenberger, and W. J. Keating, was reappointed. Clarence Keeler of the Denver Gas & Electric Light Company was the retiring president.

S. Barfoed, chief engineer for F. G. Baum, consulting hydroelectric engineer, is in Europe on a short trip home. He will also visit some of the larger hydroelectric developments in Europe before returning to the U. S. A.

Frederick S. Mills, Pacific Coast representative of the National X-Ray Reflector Company, has returned to his headquarters in Los Angeles following a trip to Salt Lake City where he addressed a meeting of the Rocky Mountain Electrical Cooperative League on the subject of "Electrical Engineering."

R. F. Walter and James Munn of the United States Reclamation Service with offices in Denver, were two of the principal speakers at the Western Reclamation Conference held in Salt Lake City.

A. W. Berresford, vice-president and director of the Cutler-Hammer Manufacturing Company, has resigned to devote his entire time to private interests. Arrangements have been made whereby his services will be available to the company on specific matters.

George W. Saathoff, construction engineer for the Cities Service Company, which operates the Denver Gas & Electric Light Company, recently arrived in Boulder, Colo., from New York, to inspect the site for the \$4,000,000 steam plant which the Denver utility is planning to erect in that city.

H. C. George, oil recovery engineer of the U. S. Bureau of Mines, headquartered at the San Francisco office of the Bureau, returned to San Francisco Jan. 16 from an extended eastern trip gathering information for the preparation of a bulletin on oil pumping methods.

Ralf R. Woolley, hydraulic engineer of the United States Geological Survey, has just returned to his Salt Lake office from Denver, where he conferred with officials of the reclamation service on questions relative to Colorado and Green River reclamation and irrigation projects. While in Denver Mr. Woolley delivered an illustrated lecture on his trip down the Green River last summer with geologists and representatives of the Utah Power & Light Company. The lecture was held under the auspices of the Colorado chapter of the American Society of Civil Engineers. Allied engineering interests were also present.

Judge E. E. Corfman, of Salt Lake City, has been appointed by Governor Mabey as a member of the public utilities commission of Utah, to fill the vacancy caused by the recent death of Judge A. R. Heywood. Judge Corfman has been a prominent member of the legal profession in Utah for many years, and for the past six years was chief justice of the Utah Supreme Court. Judge Corfman's term will cover a period of four years.

A. L. Spring, former field representative of the California Electrical Cooperative Campaign in southern California, has joined the staff of the General Electric Company in Los Angeles as merchandising specialist. Prior to joining the Cooperative Campaign, Mr. Spring was sales manager in the Los Angeles office of the Western Electric Company. Mr. Spring has been field representative of the campaign



A. L. SPRING

since its inception and was, in point of service at the time of his resignation, the oldest member of the staff. He has been one of the most active figures in the promulgation of the ideals of the campaign throughout the territory in which he worked. He has gained a most extensive acquaintance while in the employ of the campaign, which should aid him in his future work.

Manufacturer, Dealer and Jobber Activities

The P. A. Geier Company of Cleveland, Ohio, has recently announced an advertising and merchandising campaign continuing its policy, began last fall, of working with specific data rather than generalities. The February issue of its house organ, *Royal Breezes*, reveals this plan in full. Advertisements in national publications will contain facts about the disease dangers of embedded dirt, and the work of dealers and salesmen will be directed along the same line.

The Edison Electric Appliance Company and the Denver Gas & Electric Light Company conducted a novel display in the windows of the Denver company during the industrial exposition in that city. A. R. Wooley of the Edison company demonstrated how the Hotpoint iron was assembled and packed for shipping for individual customers. Over 500 irons were made up from the individual parts during the week.

The Walker & Pratt Manufacturing Company has recently placed John F. Senior as its western representative, with offices in Omaha, Neb. Arrangements are also being made to secure distributors, in the larger western cities, for the line of ranges and industrial heating equipment manufactured by the company.

The California Wire Company, of Orange, Calif., has recently received the order for the largest electrical cable manufactured by it so far. The Los Angeles Railway Company is the purchaser of the cable, which will be used on the Los Angeles railroad system. The cable will be one and one-half in. in diameter and will weigh three and one-half lb. per foot.

The Coldak Company, Springfield, Mass., manufacturers of the Coldak home refrigerating machine, has recently prepared for distribution a booklet describing the machine. Complete details concerning the operation of the machine and its adaptability to the home are contained in the booklet.

The Standard Conveyor Company, of North St. Paul, Minn., has recently purchased the rights, titles and patents of the Brown Portable Conveying Machinery Company's line. The Brown Portable line includes sectional piling, elevating, conveying, loading and unloading machinery for handling packed and loose materials. The company can now be reached by addressing mail to the Standard Conveyor Company, Brown Portable Products Plant, North Chicago, Ill.

The Sprague Electric Works of the General Electric Company, New York City, has recently started upon an educational campaign to establish the BX trade mark of the company's line of armored cable. An orange and blue tag will be attached to every coil of cable and the trade mark BX will be imprinted on the cable at 6-in. intervals.

The Electric Power Equipment Corporation of Philadelphia, Pa., has recently signed a contract with the firm of Eicher & Bratt, of Seattle, Wash.,

naming the company as representatives of the manufacturing corporation in the states of Washington and Oregon. The Seattle agents are also handling the lines of the Kelman Electric & Manufacturing Company; Pittsburgh Transformer Company; Pittsburgh Electric Furnace Corporation, and the Jewell Electric Instrument Company.

The John Hancock Electrical Company, of Denver, has recently acquired new shop facilities. Development of Columbalite lighting unit business has necessitated the expansion. Only the retail store and display room have been left at the Welton Street location, all other departments having been moved to a two-story building at 1412 Wazee Street. The spraying department has been doubled and as soon as additional equipment is received it is understood that an electro-plating department will be started.

The Combustion Utilities Corporation, of Toledo, Ohio, has temporarily attached C. B. Phillips to the commercial department staff of the Denver Gas & Electric Light Company. The assignment is made in the interests of larger fuel contracts.

The Mine & Smelter Supply Company held its annual convention of sales representatives in Denver early in January and the feature of the meeting was the appearance of numerous manufacturers' representatives, all of whom gave short talks on the products of their companies. S. M. L. McSpadden, Denver manager of the company, presided, while department heads also appeared on the program. H. J. Gundlach, general manager, made the closing talk. Among the manufacturers' representatives present were E. W. Hough, Dodge Sales and Engineering Company; W. R. Abbott of the American Steel & Wire Company; O. B. Austin, National Carbon Company; E. C. Magruder, Meadow Lark Washing Machine Company; K. L. Francis, Albert Sechrist Manufacturing

Company; Earl Wessel, Hubbard & Company; and the following from the Westinghouse Electric & Manufacturing Company: T. E. Fitzsimmons, G. B. McNair, M. E. Lanning, William Trudgian, L. J. Bridger, A. F. McCallum, W. H. Bullock, J. H. McCabe, and J. P. Sprunt, Jr.

The Hurley Machine Company, Chicago, Ill., has recently announced that their new cushion wringer roll will be standard equipment on all Thor Washers. These new wringer rolls are so pliable that they adapt themselves to different thicknesses of clothes and distribute the pressure more evenly, producing drier clothes and preventing the breaking of the buttons.

The Uehling Instrument Company, Patterson, N. J., has appointed the Mine & Smelter Supply Company, of El Paso, Tex., as its exclusive representatives for CO₂ recording equipment and other power plant recording instruments in the states of Arizona and New Mexico, and west Texas, as well as the Republic of Mexico, north of Mexico City.

The Manhattan Electrical Supply Company, Inc., of New York, has recently placed on the market a new special battery designed for operating the so-called dry battery for WD-11 type vacuum tubes. Heretofore it has been customary to operate each WD-11 tube on a single dry cell. Radio Sparkers are designed to operate each tube on a pair of special cells assembled in a container, thereby giving about three times the length of service of a single cell. In addition to the increased length of life obtainable from the use of Radio Sparkers, the additional convenience of this battery which eliminates the necessity of connecting single cells is important to owners of sets using these tubes.

R. P. Yersin, of Gallup, N. M., will open a radio and electrical store in that city in the near future. All types of radio apparatus will be handled by the new store.



When K. E. Van Kuran, president of the Electric Club of Los Angeles, says "Children, gather around," the "Kids" pour from all of the doors and windows of several houses. He seems to be quite well supplied with "Kids," too, for he acts as a semi-guardian to all of the youngsters at the Kiddie-Koop Home in Los Angeles and from the expression on the "Kids'" faces one would say that "K. E." makes a great "Kiddie-Dad." Miss Lomer of the home helped to distribute oranges among the "Kiddies."

Trade Outlook

San Francisco

The effects of the advertising of Californians, Inc., is already beginning to be felt in San Francisco. Many pieces of property are being purchased both for speculative and investment purposes. Nearly all classes of property and buildings have been the subject of sales during the past two weeks and in many cases sellers who purchased only a few months ago report that prices have been more than the purchase price of the property.

Favorable conditions both in business and finance have prevailed since the first of January and manufacturing and buying at wholesale have increased during the first of February. The market for lumber has expanded to some extent and a stimulated demand for all products has been made by all foreign countries. Inquiries concerning American goods, from Peru, Spain, Italy, Cuba, Brazil, New Zealand, and Australia, are numerous and trade excursions to South American ports are expected to bring about the establishment of new connections.

Retail buying has been fairly brisk with prices firm and in some instances tending to be higher than those quoted during last month.

Manufacturers of electric appliances are endeavoring to increase the use of electric heating in apartment houses and are having considerable success. Many architects have been won over to the idea.

Seattle

General business conditions have held up better than usual following the holiday season, and the expected seasonal lull has been less noticeable than in many previous years. This is due largely to the almost immediate revival of lumber manufacturing and logging after the holiday shutdown, which was more brief this year than usual.

Building activities continue extremely heavy, with a number of important projects announced during the past week. There is every indication that the spring months will see a tremendous construction program, and this is expected to include very heavy residence building. The building situation is featured by the number of new apartments planned at this time, and this is of particular interest to electrical contractors as practically all of the better class apartments are being equipped with electric ranges. High class buildings are expected to be electrically equipped throughout, real estate operators report, as prospective tenants demand these conveniences.

Demand for all classes of electrical devices and equipment has shown a falling off during January, and dealers are getting their stocks in shape and replenished in anticipation of a busy spring season, when home building revives, with its demand for fixtures.

Denver

With January the second high month for building permits during the preceding year, a condition primarily due to the unusually light winter weather, all types of construction business has fared so well that many contractors are as much as six months ahead. However, a severe cold spell made its appearance with February and, consequently there is marked inactivity at this time. Building permits thus far this year are past the \$1,500,000 mark.

The unprecedented building boom is again reflected in the 1922 report of the municipal board of water commissioners and the growth of the city, likewise, in the fact that 2,860 tap connections were made during the year, nearly three times as many as in the previous year which held the high mark at that time. About 60,000 customers are reported on the lines of the local central station and the new requirements developing every day for additional service is taxing the engineering department of the company.

Collections are slow and considerable difficulty is experienced in electrical lines, with slow payments by contractor-dealers.

Jobbers report a good volume of sales. Central stations are buying more. Appliances are moving slowly for February. Radio business is rather desultory. There is a marked demand for lighting fixtures and it is believed that interest could be created in better grades of luminaires with proper incentive and development.

Los Angeles

During the month of January, 1923, the city building department of Los Angeles issued 4,646 permits with an estimated valuation of \$11,258,517, as compared with 3,416 permits with an estimated valuation of \$7,975,168 for January, 1922. This represented an increase of approximately 40 per cent. During the year 1922 Los Angeles ranked third among the cities of the United States in building with a total of over \$120,000,000, being led by only New York and Chicago.

Bank clearings for the last half of January amounted to \$287,978,050.64, which compares with the same period of 1922 with \$214,155,473.59, as an increase of about 33 per cent.

Many new developments are under way which necessitate the buying of large quantities of electrical supplies and apparatus and this is particularly true of the larger apparatus. The building program necessitates the purchase of large quantities of electric supplies, conduit and wiring devices which considerably swells the sales of local jobbers. The sale of appliances continues despite the fact that in former years this was considered rather a dull season. Radio sales continue and many of the local jobbers have practically disposed of their excess stock which was on hand at the time of the depression

in the radio field, and all are genuinely optimistic regarding the future sale of this class of material.

It is estimated that there is a new electric lighting service connected every five minutes of each working day in the city of Los Angeles, for new residences, apartments and stores, which are being installed at the rate of 2,300 a month. During the last six months of 1922 there were over 1,300 new power services placed in operation in as many industrial plants while there are applications for over 5,000 for new factories or those under construction.

Salt Lake City

Salt Lake City, and the entire intermountain section, are feeling more and more the increased industrial development which is rapidly returning to normal. One of the most important factors in this situation is the recovery of the copper industry. The Utah Copper Company is rapidly increasing its production of copper as the market grows stronger, and is employing nearly as many men as during its extensive operations four years ago.

The banks of Salt Lake City are reported in better condition than for some time, and able to take care of the demands of expanding business.

The sum of \$5,000,000 in construction work and development is to be spent within the next few months in Utah in the construction of steel plants, by-product coke ovens, the development of coal and iron mines and railroad connections. This is in addition to the large sums which will be spent in subsidiary industrials that will necessarily be potent factors in the new steel industry.

Better business in both wholesale and retail branches are reported generally. Since the Christmas activity, however, sales of electrical appliances have not been very heavy. This, however, is the usual seasonal quietness, and improvement is expected with the advent of spring.

Portland

Building permits in Portland for January, 1923, were 20 per cent ahead of January, 1922, with actual building continuing at a good pace. Real estate dealers report unusual activity in lot sales. The demand for lumber is increasing rapidly and for the last few weeks has exceeded production by 25 to 50 per cent. Mills are speeding up and adding shifts with everyone expecting a good business year.

Electrical jobbers report business active for this time of year. The principal inquiries are coming from lumber mills and railroads. The latter will spend large sums on betterments as soon as the good weather arrives. Cooking appliances are moving slowly since the holidays but campaigns are afoot to help sales, especially in ranges and water heaters. The Portland Railway, Light & Power Company, which now has 2,000 ranges on its lines, expects to add 1,000 ranges this year.

Portland's bank clearings for January showed a gain of 24 per cent over the same month last year.

The weather continues favorable to construction.

Construction News

Bridges

B. C., Vancouver—The British Columbia Government has let contracts for two bridges over the Kootenay River to William Greenlees, of Vancouver. One bridge, which will cross the river at Waldo, is to have special foundations, and will cost \$39,000; the other bridge will be built near Waspa, and will cost \$19,000. Work is to be started as soon as possible on both bridges, and is to be completed before the end of the year. Mr. Greenlees submitted the lowest tender for each bridge.

Ore., Waterville—A 60-ft. bridge span is to be built over the tail race of the municipal power plant at Waterville, according to Commissioner Nels Roney. He announces that much highway work is needed and appropriations have been made for the improvement of 22 miles from Crow to the north county line; \$176,000 has been set aside for this purpose.

Wash., Spokane—A concrete bridge is to be built across the Spokane River at Trent costing \$60,370. W. J. Doust is to begin work at once and get the piers in before the high water next spring. The bridge is to be 422 ft.—center span being 150 ft. and two 80-ft. spans in addition to the approaches.

Wash., Seattle—Among the work planned for 1923 is the erection by the city of a reinforced concrete viaduct, costing \$75,000, from First Avenue to Railroad on University Street. Plans are under way in City Engineer J. D. Blackwell's office.

Wash., Seattle—D. H. Evans, county bridge engineer, recommends to the county commissioners the construction of a bridge from Jerrott to Enati, connecting Mercer Island in Lake Washington with the mainland, at a cost of \$40,000. Proposed bridge will have a horizontal clearance of 80 ft. and a vertical clearance of 30 ft.

Wash., Montesano—Grays Harbor county commissioners recently let contract for new steel bridge over Humpulips River to the Union Bridge Company, Seattle, on their bid of \$39,765. Structure will be 200-ft. steel span, resting on concrete piers.

Wash., Kelso—The Rainier-Long-Bell site for a bridge over the Columbia River is proposed. A cantilever bridge at this site is estimated to cost \$1,630,500, with operation at \$9,000 and maintenance at \$7,000 annually; a suspension bridge would cost \$2,035,000, with operation of \$9,000 and maintenance of \$6,000.

Wash., Seattle—West Seattle citizens have presented resolutions to the city council demanding that a permanent overhead structure be provided for the separation of grades of foot, vehicular, street railway and railroad traffic on Spokane Street, from West Spokane Street drawbridge to 30th Avenue S.W. and Admiral Way. The resolutions asked that a proposed bond issue to cover cost of bridge be submitted to the voters at the May election.

Dams

Calif., Los Angeles—Permit for the construction of a dam and a hydroelectric plant to cost \$40,000,000 at the mouth of Diamond Creek on the Colorado River, has been granted by the state water commissioner of Arizona to James B. Girand, Phoenix engineer. Diamond Creek is about 100 miles above Boulder Canyon, where the federal government plans to build a great dam primarily for irrigation. The Diamond Creek dam would produce about 200,000 hp. electric energy. Mr. Girand has also filed an

assignment of his rights to the Colorado River Engineering & Development Company, an Arizona corporation formed to carry out the project. Application will be made at once to the Federal Power Commission for a permit. Until this is secured, the project cannot go ahead. The proposed dam will be 300 ft. high. Bedrock was found 35 to 40 ft. below the stream bed. Water will be diverted through tunnels bored in solid rock which forms a point at the junction of Diamond Creek and the Colorado River, flowing into the creek and running back into the river.

Calif., Corcoran—All parties interested in the Tulare Lake district are working for the purpose of developing their properties. The objective of this project is the construction of a large reservoir at Pine Flat on the Kings River, about 5 miles above Peidra. A concrete dam will be erected 320 ft. high. As soon as present plans are under way, the flood waters of the Kings River will be impounded in the foothills and the surplus which reaches Tulare Lake from other sources will be controlled by means of huge canals in the lake bottom. It is proposed to finance the cost of this work on a bond issue. A petition for formation of this Tulare Lake Water Storage District is being circulated under L. B. Dapron, mayor of this city.

Calif., Oakdale—The election to vote bonds for the construction of the Melones dam and reservoir will be called within the next five months. The directors of the Oakdale and South San Joaquin district met at Manteca and ratified a resolution approving the plans prepared by Engineer A. J. Wiley and will forward them to the California state bond certification commission. One proposition will call for bonds to build Melones reservoir. A second proposition will provide for bonds for enlarging the canals of the Oakdale district to carry the additional water. As soon as the bond commission approves the project the districts can call the bond election.

Wash., Walla Walla—The Burbank district has received federal approval to build a temporary dam across the Snake River, the cost of which is estimated to be about \$42,000.

Wash., Clarkston—Plans are being made for the proposed Dry Gulch dam near Clarkston. The estimates range from \$550,000 to \$1,000,000. It is hoped that this session of Congress will give help to this project.

Wash., Everett—Bids will be called shortly by city commissioners for excavation for the 20,000,000-gal. reservoir proposed by the city. The work will involve 235,000 cu. yd. and will cost between \$75,000 and \$100,000.

Ore., Klamath Falls—Plans for the expenditure of the \$700,000 allowed as an appropriation for work on the Klamath project for 1923 are set forth in the estimate made for the construction of a storage dam for the Horsefly reservoir. This will cost about \$275,000. It will have a capacity of 90,000 acre-feet and will furnish a stored water supply for 14,000 acres of agricultural land in the Langell Valley. It is estimated that approximately 25,000 acres can be reclaimed from the Tule Lake. This land will be available for soldier settlement. In the Langell Valley division \$20,000 is requested to complete the lateral system on Clear Lake, part of that division which is now under construction; \$4,000 is requested for quarters for employees, and \$10,000 for the construction of telephone lines. On the main division \$5,000 is requested for replacing the Lost River flume and \$10,000 for replacing the Poe Valley flume.

For miscellaneous lateral extensions to provide irrigation service for lands which have been forced into the Klamath Irrigation District, \$5,000 is estimated. Lateral extension in the Tule Lake district will cost about \$100,000.

Highways

Calif., Los Angeles—Geo. H. Oswald, 336 East 58th St., Los Angeles, was awarded contract at \$143,055 for grading and paving with asphalt-concrete 9.36 miles of state highway in Imperial County, between new county well and old county well at plank road.

Calif., Pasadena—City Manager C. W. Koiner has started a movement to secure two additional roads leading into the Arroyo Seco, at the site of the new stadium. The roads will be 100 ft. wide and lead from Linda Vista Ave. to the upper and lower ends of the stadium.

Calif., San Francisco—District Engineer, Bureau of Public Roads, 881 Mills Building, San Francisco, will receive bids for constructing federal roads, as follows: Feb. 27—Mineral projects, Tehama County, Calif., Red Bluff-Susanville, about 40 miles east of Red Bluff, final plans ready Feb. 1; project 10 to 12 miles long, about 150 cu. yd. excavation, 1 steel truss bridge, 70-ft. span; total cost \$175,000; April 15—Current Creek, Nye County, Nevada, on Ely-Tonopah Road, 40 miles southwest of Ely; length, 18 miles; May 1—Austin-East, Langer County, Nev., on Austin-Eureka Road, about 12 miles east of Austin; length 18 miles, about 80,000 yd. excavation; May 15—Meadow Creek, Elko County, Nev., a portion of the Gold Creek-Jarbridge project, 72 miles north of Elko, about 18 miles, consisting of grading and drainage structures, 90,000 cu. yd.

Mexico, Mexicali—Gov. Jose Inocente Lugo has announced that \$400,000 would be spent in 1923 for paving, constructing walks, and other improvements in northern Lower California, principally in Mexicali. A large part of the improvement funds for this district are being raised by bond issue.

Ore., Wallowa—The tentative road program for 1923 of the forest service for Wallowa County calls for 58 miles of construction at a cost of \$83,000. The forest service proposed to spend \$26,000 on this portion of the Pomeroy-Wallowa Interstate Road.

Ore., Astoria—Three important highway improvement projects are to be undertaken by the Clatsop County Court during the coming spring, and bids on them will be opened in February. Those projects are: The paving of five miles on the main Nehalem highway, an appropriation of \$100,000 having been made for that purpose; and the paving of about 2½ miles on the Young's River falls highway. The county will this year construct three new bridges in addition to the Lewis and Clark bridge, which is to be built under the supervision of the state highway commission.

Wash., Spokane—Spokane County Commissioners have awarded to the Independent Asphalt Paving Company, Seattle, contract for paving 8.7 miles of the 20-ft. Trent Highway, on their bid of \$210,094. Contract calls for 7-in. concrete paving. The commissioners have announced the county's road-building program, calling for the expenditure of \$750,000. Plans have also been completed for the road-building program in 1924, which calls for expenditure of \$850,000 and construction of 100 miles of highway. Plans provide for construction costs of \$8,500 to \$10,000 a mile, for macadam finish 16 ft. wide and 8 in. thick, with crushed rock base. More than 43 miles of the highways to be built in 1924 have been surveyed.

Wash., Seattle—Among the highway projects planned for early beginning by the King county commissioners, according to County Engineer T. R. Beeman, will be the Salburg Road, costing \$60,000; the Stevens Highway, costing \$50,000; Issaquah Road to Hobart, costing \$20,000.

Wash., Spokane—Plans for extension of the Northwest Boulevard arterial highway from Kiernan Avenue to connect with the Nine Mile Road, have been completed by A. D. Butler, city engineer. Work will cost \$50,000.

Irrigation Projects

Ariz., Phoenix—Shareholders of the Salt River Valley Water Users' Assn. have approved a bond issue of \$1,800,000 for the construction of the Mormon Flat development project. Work has already started. The proposed work involves the preparation of the spillway of the Roosevelt dam for 19 gates to raise the height of the dam 15 ft., the installation of a 7,000-hp. generating unit in the Roosevelt power plant and the construction of a dam at Mormon Flat, 27 miles below the big dam. F. A. Reid is president of the association. The issue carried by a vote of 14 to 1.

Calif., Oroville—The board of directors of the Thermalito Irrigation District recently decided on an election to be held Feb. 23, for the purpose of voting on a bond issue of \$270,000. The proceeds will be used for construction work in the irrigation district.

Ore., Bend—A contract between the Powell Butte irrigation and the North Canal Company to build a central Oregon canal has been signed. An irrigation system sufficient to water 13,000 acres of land at a cost to the district of \$838,750 is to be constructed. The district agrees to pay \$63.75 per acre for the completed system. This gives them an interest in the north canal, in the north canal dam, in the central Oregon canal and in the Crane Prairie reservoir.

Wash., Olympia—Marvin Chase, state supervisor of hydraulics, has approved plans of Burbank Irrigation District No. 4 for a wing dam in the Snake River above Five-Mile Rapids, to divert water into the district canal for irrigation purposes.

Wash., Yakima—L. C. Holt, supervising engineer for the Indian Reclamation Service, is preparing plans for the expenditure of \$125,000 on the Satus irrigation project for the present year.

Wash., Yakima—A bill appropriating \$1,300,000 for reclamation work in the Yakima Valley has passed both houses of Congress. The money will be spent chiefly on the Rim Rock dam, where about 500 men are now employed. This dam will save about 140,000 acre-feet of water each year, and with the normal flow of the Yakima River, will make available an additional 140,000 acres of arable land.

Wash., Okanogan—Early development of the Whitestone irrigation project in north central Washington, near the Canadian boundary, is promised. The state, through the department of conservation and development, has arranged to purchase \$700,000 of the bonds of the Reclamation District, thus providing funds for the work. The Whitestone project contains about 8,500 acres of land, and adjoins the West Okanogan district, and will cost approximately \$750,000 to completely develop.

Power Projects

Calif., Banning—San Geronimo Power Company has been granted permission by railroad commission to construct two hydroelectric plants near Banning. Permission was also granted the company to sell \$400,000 of bonds and \$100,500 of common stock. The \$100,500 stock shall be used to pay for properties transferred to company. The San Geronimo Company was given permit to lease its properties, when completed, to Southern Sierras Power Company. Construction will be in charge of C. O. Poole, chief engineer of the Southern Sierras Company.

Calif., Pasadena—Planning for the future expansion of the municipal lighting department, Manager C. W. Koerner states it is planned to erect cooling towers, outdoor high line construction and a step-up substation on property ad-

joining the plant on Glenarm Street which will give the city the entire frontage in the block to South Fair Oaks Avenue. The land the city seeks is owned by the Pacific Electric Co. and the Union Pacific Railway, and proceedings have been instituted for the acquirement of this property.

Calif., Crescent City—The Smith River Light & Power Co. has been organized, with C. Romander as general manager, for the erection of a power plant on Smith River. It will consist of dynamos driven by Diesel engines. The company has taken over the local water works and will make extensive improvements, including a new reservoir. Henry Westbrook, Sr., is vice-president, Geo. D. Wood is secretary and treasurer of the company.

New Mex., Farmington—Construction of a high tension line from Durango, Colo., to this place has been announced by the Western Colorado Power Company, which will include the San Juan basin, where operations resulting from the development of railroad and coal properties by Los Angeles capital has started an industrial boom.

Wash., Wenatchee—The Washington Water Power Company plans to extend its transmission line to Lake Chelan to provide electric light and power to the Manson district, on the north side of the lake. Franchise has been granted by Chelan County.

Wash., Spokane—The Washington Water Power Company plans the building of a 60,000-volt line from Pullman to Moscow, a distance of 11 miles, as an extension to the new power line from Lind to Pullman. The line will replace the present 22,500-volt line supplying power to Pullman from Moscow.

Wash., Vancouver—The Clarke County Light & Power Company has been formed for the purpose of establishing a power plant to supply the Battle Ground district with light and power. Application for franchise is now before state officials.

Wash., Seattle—The Westinghouse Electric & Manufacturing Co., on its bids of \$49,307 and \$24,934 for items 1 and 2 respectively, received the contracts for furnishing insulators and hardware for the Skagit River development project. Plans have been approved by the board of public works for electrical equipment for the North substation, to be installed in connection with the Skagit River power development, and call for bids for furnishing this equipment will be made shortly.

Wash., Tacoma—The Puget Sound Power & Light Company was recently granted a 25-year franchise to construct and operate transmission lines in a large district in Pierce County. Service will be given in Puyallup, and on the Schoenboekler, Mott, Sumner-Edgewood, Parker, Ackerman Roads, and on the Pacific Highway in section 14.

Wash., Hoquiam—The Grays Harbor Railway & Light Company recently completed and put in operation its new transmission lines to Montesano. The company recently entered into a contract to sell power to the east end of the Grays Harbor County.

Power Plant Equipment

Calif., Long Beach—William P. Graef, district manager of the Southern California Edison Company, announced that a transformer plant will be built at the intersection of alleys between Pine and Locust Streets and Ocean Blvd. and First Street. Cost, \$250,000.

Calif., Hanford—The Southern California Edison Company will spend \$60,000 the coming year in erection of a substation here, also a store house and garage and in improving the distribution system. E. S. Hamilton is district manager with headquarters here. The sum of \$78,000 will be used in improving the service outside of Hanford.

New Mex., Lovington—A movement has been started by city officials looking toward the rebuilding of the local light plant, which has been out of operation for nearly a year.

Wash., Everett—The Puget Sound International Light & Power Company recently placed in operation its \$30,000 substation at Martha Lake. The new station will furnish light and power to factories and homes along right-of-way of the Everett-Seattle interurban between Martha Lake and Beverly Park.

Wash., Wenatchee—The White River power house is to be enlarged by the Stone-Webster Company, including the installation of new machinery. The addition will furnish power to Wenatchee.

Railways

Calif., Arcadia—Omer Huffman, Arcadia, has the contract to erect a hollow tile station building at First Ave. and St. Joseph St., for Pacific Electric Railway. It will have inside and outside waiting rooms for men and women, and two lavatories. Hollow tile walls, stucco exterior, red tile roof.

Calif., Los Angeles—The Pacific Electric Railway Company has purchased the Olive Street school property on Olive Street between 4th and 5th Sts., preparatory to constructing a subway from the Hill St. station to Glendale Blvd. and First St. It is stated that work will commence this spring. The subway will cost about \$3,000,000.

Calif., Los Angeles—According to I. L. Hibbard, general manager, Coast lines A. T. & S. F. Railway, the Santa Fe will double track a large portion of the coast line during 1923. The amount planned for this year is 137.5 miles, which will cost about \$8,000,000. It is planned to double track all coast lines as far east as Albuquerque, N. M., the eastern terminus of the coast division.

Calif., Los Angeles—The Union Pacific Railway Company will erect a terminal on the company's main line between the Jaboneria Road and the Telegraph Road, south of 9th St. The first unit will contain an engine house, locomotive shops, freight car shops, etc. T. C. Peek, general passenger agent. Cost, \$1,750,000.

Calif., Los Angeles—Work will start on the \$5,000,000 Hill St.-Glendale Blvd. Tunnel to be built by Pacific Electric Railway Company early in the spring, according to Frank Karr, second vice-president. Tunnel will start from Olive Street and run on to Maryland Street, from there to Flower Street and from there northwest, connecting at First Street with present Glendale Blvd. line.

Calif., Los Angeles—The Union Pacific Railroad Company will erect a roundhouse, supply depots and small machine shops on 60-acre tract between Citrus and Mill Sts., Colton. Cost will be over \$1,000,000.

Mont., Livingston—A new \$150,000 boiler shop is to be built during 1923 for the Northern Pacific Railroad, as announced by P. M. Rapelje, vice-president in charge of operations; 5,280 freight cars and 49 locomotives have also been ordered for use of the northwestern shippers.

Wash., Spokane—Among the improvements planned by the Great Northern Railway is completion of a block signal system between Spokane and Wenatchee, at a cost of more than \$400,000, according to C. O. Jenks, vice-president, who states that oil-burning locomotives will be installed on western divisions, and that orders for 1,500 box cars have been placed. Three million dollars for automatic block protection, double tracking, etc., will be spent by the company in Washington and the Rocky Mountain district.

Wash., Longview—Twelve bids received by the Longview, Portland & Northern Railway Company, owned by the Long-Bell Lumber Company, for the construction of the first unit of 8½ miles of a contemplated 30-mile railway, have

been held up due to the Kelso bridge disaster. The work involves 153,580 cu. yd. of excavation, 39,300 cu. yd. of loose rock, and 59,300 cu. yd. of solid rock excavation.

Wash., Bellingham—The Puget Sound Power & Light Company announces through Manager H. B. Sewall, that it will expend \$60,000 in rebuilding certain tracks and repaving between them, during the year. The Pacific Northwest Traction Company, of which H. B. Sewall is also manager, will expend approximately \$150,000 in rebuilding the four and one-half mile waterfront trestle, used by the company's interurban. Three million feet of lumber and 20,000 ties will be needed for the improvement.

Street Lighting

Calif., Los Angeles—Proceedings are under way for the construction of an ornamental lighting system for Hollywood Blvd., between Vine Street to Sanborn Junction. The standards are to be of cast iron, Grecian pattern, with two form 18 Novalux lantern lighting units, with 600-cp. lamps. The lanterns will be of alabaster rippled glass. The lights were designed by the General Electric Company. The municipal art commission has approved the design.

Calif., Los Angeles—City council has adopted ordinances ordering construction of ornamental lighting system, complete, in Palos Verdes St., between Sixth and 14th Sts., San Pedro; also in Belle Porte Ave., between Weston St. and 55th St. Plans and specifications on file with city electrician, second floor, south city hall annex.

Calif., Redlands—City trustees are discussing purchasing wholesale current necessary to light city streets. A change in the system will be made from multiple to series system, necessitating an expenditure of about \$10,000 by the Southern California Edison Company. Ornamental lights are to replace the old gooseneck type now in use. The first streets to be improved by the use of ornamental lights are Cajon and Highland Ave. George S. Hinckley, city engineer.

Calif., Culver City—Plans are being considered for an elaborate ornamental lighting system to be installed along Washington Boulevard, throughout Culver City.

Calif., Pasadena—W. A. McNally Company was awarded the contract at \$11,536 for constructing lighting systems on Madison Ave. from Colorado to Fillmore Sts. and at \$2,675 for similar work on E. Colorado St., from Maringo to Los Robles Ave.

Calif., Los Angeles—Newbery Electric Company, 724 So. Olive St., has submitted low bid to board of public works, at \$14,478 for constructing ornamental lighting system in No. Main St., between Eastlake Ave. and Daly St.

Colo., Lamar—Although the project has not been completely financed, plans are being pushed for an ornamental street lighting system, preliminary contracts for the cable and regulators already having been let by the city council. J. E. Todd, municipal superintendent, advises that bids for the 80 standards, tops, and other necessary equipment will be received shortly.

Wash., Olympia—Material is on the ground for Olympia's boulevard lighting system, and erection of the poles and completion of the system will be rushed. Removal of overhead wires in the downtown district by the Western Union and Pacific Telephone companies is under way.

Streets and Sewers

Calif., Huntington Beach—City trustees have passed a resolution of intention calling for a \$300,000 bond election for paving of Ocean Ave., from First to 23rd Sts. The remainder of the money will be used for the installation of lights,

culverts, drainage, and grading. Date of election will be set later.

Calif., Santa Ana—The Water Works Supply Company here was awarded contract for the furnishing of equipment for the treatment plant for the joint outfall sewer system being built by Santa Ana, Orange, Anaheim and Fullerton. Price, \$39,897. City engineers have been instructed to prepare plans for the building which will house equipment.

Calif., Pasadena—The Alhambra Feed & Fuel Company was awarded the contract for the excavation of the sewage disposal plant to be built on the city farm. Price, \$0.52½ per cu. yd. The Smith-Booth-Usher Company was awarded the contract for the purchase of 3 Connersville blowers, \$2,910 for 50-hp. and \$4,219 for 100 hp. They will furnish a Westinghouse motor-generator exciter. Price, \$1,105. Walter Hassendahl was awarded the contract for furnishing the De Laval pumping units, prices being \$680 and \$1,743. Work will start soon.

Calif., Orange—It has been definitely determined that Orange will run its main line sewer (portion of the inter-city outfall system) from Orange to join the main line of the Anaheim sewer to the treatment plant at the point where the Pacific Electric Railway tracks cross the Garden Grove road east of Garden Grove. The line is estimated to cost \$55,000.

Calif., Lodi—The \$100,000 bonds for a sewage disposal plant carried. The plant will be built on the tract of land belonging to the city of Lodi on the banks of the Stockton-Mokelumne canal and will be of the activated sludge system.

Calif., San Francisco—The board of public works has awarded contract for the Army Street sewer to the Clinton Construction Company, on a bid of \$145,609.

Calif., Los Angeles—Bids were reopened recently by the board of public works for the removal of 700,000 cu. yd. of sand from the site of the proposed sewage-screening plant at Hyperion. Five bids were submitted, that of John Balch being the lowest. His figure for the work was \$97,704, which is approximately \$22,000 less than his first bid. It is lower by about \$35,000 than the figure set by the city engineer. All other bids received showed material reductions as compared to estimates received when bids for the work were first opened on Jan. 29, last. The screening plant is to be the first of the improvements under the \$12,000,000 sewer bond issue recently voted.

Colo., Denver—Actual work on the construction of the \$1,000,000 Park Hill storm sewer, the largest sewer ever constructed in the city, will be started in the spring. Walter B. Lowry, manager of improvements and parks, stated recently, following a tour by city officials of the district to be drained by the sewer. The drainage area to be covered by the sewer will comprise nine square miles, the assessable area being 54,200 lots. This drainage area has been definitely mapped out. The maximum sewer will be 11½ ft. in diameter. The original estimated cost of the sewer is \$1,250,000, but this estimated cost only applies to the main and sub-mains. When the lateral sewers are built, the total cost of construction will be close to \$2,000,000. Bids for construction of the sewer, it is predicted, will be opened between Apr. 15 and May 1, actual construction work beginning a short time later. Chas. A. Davis is designing engineer of the sewer system.

Wash., Seattle—Contract for paving and installation of water mains on North 77th Street has been awarded to Fiorito Bros., on their bid of \$39,249. Eleven other bids were submitted, all closely competitive.

Wash., Hoquiam—Creation of several large sewer districts is planned for this city during the present year, in connection with proposed new paving work.

Wash., Seattle—The board of public works has awarded contract for the paving of Alki Ave. from the ferry landing along the waterfront between Luna Park and the municipal bathing beach, to Swensson Construction Company on a bid of \$111,752.

Wash., Aberdeen—The city recently awarded to the Central Foundry Company of San Francisco and New York, contract for furnishing pipe for an auxiliary water main into the residence section. Bid totaled \$44,000.

Waterworks

Calif., Fresno—Improvements to the Fresno City Water Company system, involving an expenditure of \$350,000, have been authorized by the board of directors of the San Joaquin Light & Power Company as a part of a \$4,500,000 budget passed at the annual meeting of the directorate held in Los Angeles, according to General Manager A. G. Wishon.

Calif., Chico—Decision to call a special bond election to purchase the water system of Chico or provide a municipal water system was reached at a recent meeting of the trustees. The election is to be held on March 3 to vote on a bond issue of \$475,000.

Calif., Santa Barbara—An \$850,000 bond issue for the installation of a water distributing system and a water tunnel will be voted on Feb. 27, in the Montecito Valley.

Calif., Ventura—The board of trustees is planning to call a bond election soon for securing a water system here.

Calif., Banning—The City Water Company of Banning is planning to spend over \$35,000 in improvements to the water system of Banning. The water plant will be rebuilt, water mains enlarged, and 50 fire plugs installed.

Calif., Los Angeles—\$100,000 Angeles Mesa district bonds for the purchase of the present system and installation of new water mains carried, 410 for and 155 against.

Colo., Englewood—A \$250,000 bond issue for the construction of a municipal water works for Englewood was overwhelmingly defeated in a special election held recently.

Utah, Kamas—The people of Marion, four miles north of this place, are making preparations to begin work on their proposed water-works system. Estimates are now being received as to the cost of the project. A reservoir will be built and a fall of 200 ft. will be obtained. A large pipe will be used for part of the main line, then reductions to three-inch, two and one-half inch and finally to two-inch will be made. The system will cost between \$12,000 and \$15,000.

Wash., Longview—The Long-Bell Lumber Company, which is building the town of Longview, has applied to the state supervisor of hydraulics for permit to divert the water of two streams to furnish domestic and industrial water supply for the town. The company proposes the expenditure of about \$700,000 in constructing two diversion dams and necessary pipe lines.

Miscellaneous

Ore., Portland—The Public Dock Commission is negotiating for the purchase of a tract of land adjoining Terminal No. 1. Tentative plans provide for the construction of a wharf covering the entire area, together with the necessary sheds, trackage and new slip. This will assist in handling the rapidly growing commerce of the port.

Wash., Seattle—Piers—The Pacific Steamship Company, operating the Admiral Line, plans the construction in Seattle of a great ocean shipping terminal costing \$3,000,000, including three huge piers, 1,100 ft. in length, warehouses of large capacity and an office building. The company is negotiating for a 20-acre tract of land estimated to cost \$600,000.

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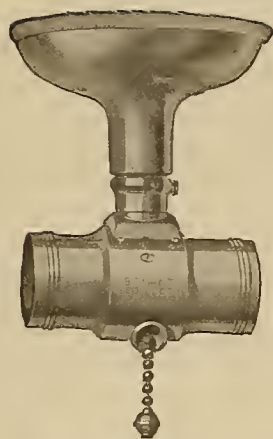
ACTUAL SIZE

Here is a Bryant Unit Wall Bracket that is useful in shops, offices, stores and in certain places in dwellings.

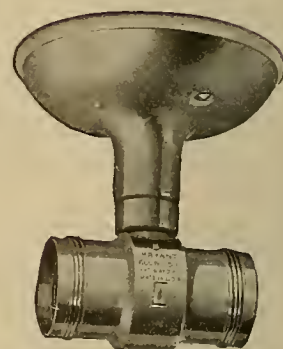
It is composed of a No. 694 brass covered porcelain base with $\frac{3}{8}$ inch stud and a No. 4237 pull socket.

The base is $3\frac{5}{8}$ inches in diameter with two mounting screw holes spaced $2\frac{3}{4}$ inches on centers, exactly right to cover a $3\frac{1}{4}$ inch outlet box. The distance from bottom of base to center of No. 4237 socket is $3\frac{1}{8}$ inches, ample for a proper size of shade. The standard finish is Brush Brass. Special finishes available at small extra cost. The rating is 250 watts 250 volts.

The List Price of No. 674 is \$1.30, Schedule H2, Standard Package 50, Carton 1. The No. 694 base alone without socket is \$0.60 list, same schedule, package and carton.



The No. 694 base used with a Bryant No. 4006 Twin Pull Socket makes a dandy ceiling fixture. The cost of the combination is only \$1.66 list.



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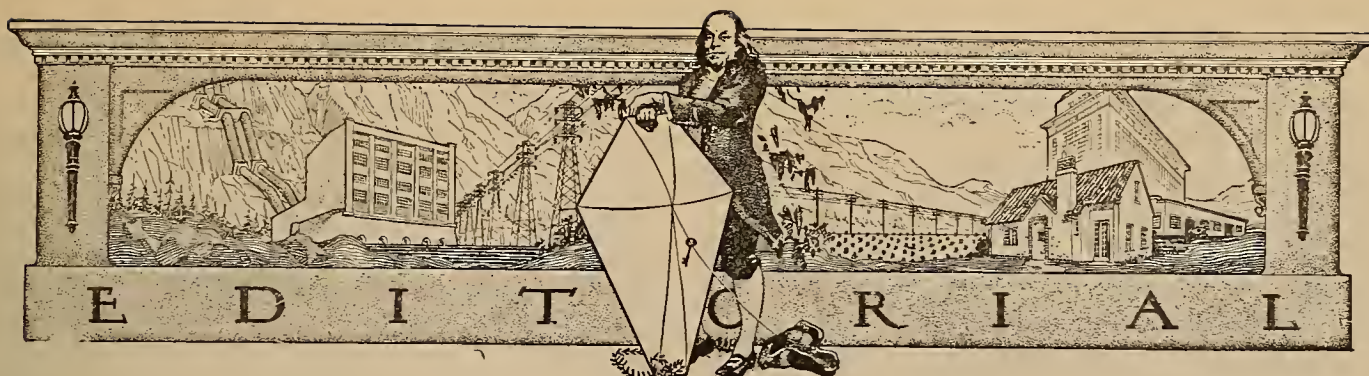
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SAN FRANCISCO
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Co-ordination is Needed to Supplement Cooperation

THE electrical industry, distinctly a product of the present century, has, during the short span of its existence, evolved a system of organizations which are not paralleled in any other industry. Each of the four major branches of the industry, manufacturers, jobbers, contractor-dealers and power companies, has its national organization. Each has fairly well distributed local branches. In addition, electric clubs, consisting of men from all branches of the electrical and allied industries, are banded together in the larger cities for their common benefit. Cooperation has long been the watchword of the industry, and cooperative leagues and campaigns have been set up in several of the states of the West, with successful results.

THE progress of the development of the various electrical organizations has been logical and orderly, but the industry has progressed to a place where, to obtain the most effective results in the way of organized effort, a co-ordination of interests must be effected. National recognition of this fact is evidenced by the formation of the Joint Committee for Business Development and the Society for Electrical Development.

CALIFORNIA has been among the leaders in all phases of electrical development. It has been the proving ground for many ideas now nationally recognized and today in electrical organizations it is unsurpassed. Leaders of electrical thought in that state have recognized the need of a co-ordination of interests in the electrical organizations now existing and are proposing the tying together of all organizations into a simple, workable whole. The California Electrical Cooperative Cam-

paign has been suggested as a State electrical co-ordination committee. The proposal suggests the broadening of the membership of the advisory committee of that body to include representation from the major electrical clubs, as well as the organizations now represented thereon. The various electric clubs are the only truly democratic organizations within the industry where the rank and file meet with the executives on a common ground. They deserve representation. The industry would be strengthened thereby.

THE California Electrical Cooperative Campaign is today equipped financially and in personnel to carry on a great work. But it has ceased to be merely a Campaign. It is a permanent body recognized as indispensable to the industry's future growth. It is in reality the California Electrical Development League.

THE Campaign has been strengthened by the recent decision to include all interests engaged in merchandising electrical materials and appliances. It would gain immeasurably by changing its name to something less cumbersome and one that would indicate its solidarity and permanence. The Cooperative Campaign and the industry would both gain by the co-ordination of interests which would be effected by the inclusion of the great democratic electric clubs.

CALIFORNIA has a chance again to be the leader in progressive policies. The executive committee of the Cooperative Campaign should adopt the idea of still further broadening its scope. In so doing it will write another chapter of progress in a movement that has succeeded in real and continued accomplishment.

Customer Ownership of Securities Secures National Recognition

CUSTOMER ownership of the securities of public utilities is no longer considered a novelty in the West, where this idea originated. Power companies particularly have been thoroughly converted to the many advantages of having a wide distribution of stock among their respective consumers. It not only affords them a broad market for securities, thus enabling them to finance the amazing growth which has characterized most of them during the past decade, but it acts as a foil to the unscrupulous political agitator.

The success of the western public utilities, whose ideas have by now been widely copied, is being accorded somewhat belated national recognition. Customer and employee ownership of securities is advanced by some economists as a remedy for many of the ills that beset industry in general.

Typical of the many tributes which are now being paid the pioneers in customer ownership of public utility securities is the following extract from an address by a prominent manufacturer before the Indiana Public Utility Association:

"Begun in the midst of war—the customer-ownership movement commands the admiration and generous praise of industry generally, particularly of industries engaged in rendering public service. Within a few years this movement has brought about the diffusion of public ownership of public utilities among 1,750,000 persons as compared with the few thousands of stockholders of a short time ago. In 1922 alone more than \$175,000,000 of securities were sold to customers of public utilities. This year it is reliably predicted that sales to customers will exceed \$250,000,000. Here is a movement that offers all the advantages claimed for public ownership, but retains all of the benefits of private initiative and enterprise."

Western power companies have found that the wide diffusion of ownership has created a public knowledge of utility problems and an understanding of the fallacies of public ownership which will tend to ward off unwarranted political attacks.

Carrier Current Demonstration of Interest to Power Companies

A NEW use of radio was brought to light recently by one of the large electrical manufacturers, when it was demonstrated that voice conversations could be carried on by means of radio waves over high tension power lines, without the use of switches and just as are done in the ordinary telephone connection. The test was carried out between experimental stations located about 30 miles apart, on the lines of an eastern power company, by engineers of the manufacturing company and the power company. It was also demonstrated that this system could be used for remote control of all manner of apparatus.

Carrier current for use in central power stations and electric railways, or other points using high tension electrical lines, has long interested power company engineers, the idea being to superimpose

radio waves on the power lines and thus make use of radio transmitting and receiving for both voice communication and control of remote switches.

Preliminary research work on ordinary transmission lines and feeder circuits had indicated that the use of wired wireless communication was simple and effective on such lines. In complicated and extensive systems, such as are met with in practice, many additional problems had to be solved before it could be demonstrated that carrier current despatching could be done successfully.

The members of the radio sub-committee of the National Electric Light Association recently witnessed a demonstration of this method of communication and control, which was entirely successful and demonstrated conclusively that this method, interlacing the telephone with the power lines, would soon be a feature in the plants of more progressive companies.

The carrier current system of telephony allowing communication over high tension lines, besides saving an additional right-of-way, does away with the great noises and high induced voltages which operators so much dread in talking along lines that parallel high tension systems.

The new system was demonstrated over a 66,000-volt line and is unique in that the system is duplex and operates as does the ordinary telephone. When the telephone receiver is unhooked, the transmitting station automatically starts up, allowing talk in both directions without any switching. This feature is entirely new in radio as all other transmitting and receiving must be done by switching back and forth, because a station transmitting will not receive messages. The transmitting apparatus must first be switched off and the receiving circuit switched in. However, all this is done away with in the newest of systems.

Municipal Ownership to Be Issue in Denver City Elections

A PAUCITY of income from tax sources is one of the paramount problems of Colorado and its chief cities, and yet the situation has just been complicated, especially in Denver, with the announcement by Governor Wm. E. Sweet that he will not support any candidate for mayor who is not in favor of municipal ownership of public utilities. No plan is being offered, however, as to how the revenue situation will be relieved if Denver's public utilities, among the heaviest taxpayers in Colorado, are placed in the municipal ownership column, thus withdrawing their financial support from city and state.

Municipal ownership will undoubtedly be the issue upon which the spring election will be predicated, notwithstanding that government operation of public utilities has received a black eye in several states within the last few months, notably in California, Michigan and North Dakota. The franchises of two of Denver's major utility organizations expire in 1926. It is believed that the question of renewals, as against municipal ownership, will be a definite issue by May, when the city election occurs, despite

the fact that the Denver Tramway company has been in the hands of a receiver since 1921.

Mr. Sweet, Colorado's governor, although part owner of an electric utility and until recently part owner of a combined gas and electric company, favors government ownership. He also condemns state regulation despite its successful operation in forty-seven states in the Union. There are still some people who, disregarding the many failures of municipal and public ownership enterprises, would attempt to pilot their pet schemes through dangerous waters, with the inevitable result. Government ownership, however, is on the wane. The public generally has largely penetrated the weaknesses of City Hall service in its utilities, and is getting more inclined to look before leaping.

Need of the Establishment of National Hydraulic Laboratory

OF considerable interest to the engineers of the West is the bill presented before the Congress now in session relative to the establishment of a National Hydraulic Laboratory, wherein experiments and studies could be made in river flow and flood control. The Federated American Engineering Societies was instrumental in having the bill introduced and endeavored to secure the passage of the bill.

The United States and the several states are spending annually from seventy to one hundred million on river improvements of various kinds. Each year there is a large property loss and human suffering due to floods. The most adequate solution of the many problems incident to river flow and flood control has not been determined. In fact, there is a marked difference of opinion among eminent engineers as to the best measures to use under certain circumstances. This is not surprising in view of the fact that the only scientific laws available concerning river flow and flood control are those developed through a series of experiments conducted on a small section of a river in France some ninety years ago, supplemented by some experiments made on the Mississippi River sixty or seventy years ago.

At the present writing the fate of the bill is unknown, but it is of sufficient importance that, should it fail of passage, steps should immediately be taken to enlist the support of all western legislators to insure its passage at the forthcoming session of Congress.

Improvement Shown in Street Lighting During Past Year

IMPROVEMENT in street lighting has made very satisfactory progress in the cities of the western states during the past year. In the aggregate contracts for street illumination represent the largest municipal expenditures. Noticeable among the events of 1922 has been the increasing interest shown by small cities and towns throughout the West in improved street lighting. In one district alone containing a population of one and one-half million people, over two million dollars has been appropriated for ornamental street lighting.

Low intensity overhead fixtures at street intersections, in many cases the only type of illumination existing in rapidly growing towns, are being replaced by ornamental single-lamp units. The modern units present a marked contrast to the inefficient multi-lamp clusters at one time widely used for lighting business districts, and the unsightly wooden-pole, mast-arm, dangling-wire type which have been used extensively in the past for the lighting of thoroughfares and residence streets.

The design and efficiency of street lighting units has shown remarkable efficiency in the past few years. The incandescent electric lamp seems to have reached a period in its development where striking changes are rare. Yet a new 2500-cp. gas-filled incandescent lamp has been placed on the market which is the most powerful light source ever made available commercially for the lighting of streets. It is particularly adapted to business street lighting in those cities where it is desired to use especially high levels of lighting in important, congested districts. It is possible from this light to obtain nearly twice as much light from a single incandescent source as could be obtained heretofore.

The trend in design of street lighting units is commendable. Most units show the result of efforts to combine a pleasing appearance with effective light control. Most striking of all, perhaps, is a tendency toward a higher mounting in all branches of ornamental lighting.

Proposed Classification of Fires Meets with Underwriters' Approval

THE proposed classification of fires attributable to electrical origin, which was originated by the Society for Electrical Development some months ago, seems to have met with considerable favor. A number of the Fire Underwriters and other insurance organizations have expressed interest and the Electrical Manufacturers' Council, among others, has endorsed the plan. For the purpose of clarity, some slight explanation of the original classification has been agreed upon, as follows:

1. Fires caused by defective or improper wiring, sub-standard apparatus and installations, etc.
2. Fires caused by over-fusing and overloading electric circuits.
3. Fires caused by electric flat irons, curling irons and similar devices, worn portable cords, old electrical appliances, etc.
4. Fires caused by street railway current, automobile electric systems, high tension power lines, etc.
5. Fires caused by static electricity, lightning and electrical disturbances over which little control is as yet possible.

Such simple and comprehensive grouping of fires due to electrical causes promises to prove an effective instrument in the reduction of faulty electrical installations due to careless and irresponsible workmanship. This scheme not only classifies such fires according to their origin but puts the blame for them directly on the responsible party. This cannot fail to be productive of much good.

CURRENT COMMENT



That the automobile plays an important part in rendering prompt and efficient service to central station consumers is indicated by figures issued by

Automobile Is Factor in Utility Service

Pacific Gas & Electric Company. During the past year, 387 touring cars and roadsters, 409 trucks, 10 one-horse wagons, and

20 two-horse wagons were used. These vehicles traveled 7,500,000 miles or the equivalent of 2,500 trips across the continent. Thirty different makes of automobiles were used and 4,800 tires were worn out. The tires included 33 different makes.

Railroad taxes have more than trebled during the past ten years, according to a statement by W. B. Storey, president of the Atchison, Topeka & Santa

Railroad Taxes Treble in Ten Years

Fe Railway, which is being published in the form of an advertisement in the newspapers throughout the territory which the railroad serves. The state-

ment brings out the fact that the total tax bill of the Santa Fe has mounted from \$4,438,000 in 1912 to \$14,836,000 in 1921, or, during the ten-year period, from \$414 to \$1,270 for every mile of railroad operated. The statement of the president of the Santa Fe is not applicable to his company alone, but to the systems and works of every public service company in the country. Each, alike, is staggering under an immense burden of taxation.

The magnitude of the bill suggests one reason why new stations, locomotives and cars, and new lines are possible in only a limited way and why passenger rates are so much higher than they were ten years ago. There is an old saying that nothing is more certain than death and taxes. In this case it is certain that the tax bill comes first.

The comprehensive study of street lighting service which was undertaken by the Bureau of Standards several years ago and which was interrupted by the

Bureau Plans Study of Street Lighting

war is again being actively carried forward. This study will cover street lighting in all of its phases—gas, electric, and other special types. The problems of

design of street lighting systems from the illuminating standpoint, the distribution of gas and electricity for street light, methods of operation and maintenance, and the technical and engi-

neering features of street lighting contracts will be included in the study. The results of studies and investigations made by the Illuminating Engineering Society, electric and gas associations, municipal engineers, city managers, and manufacturers of street lighting supplies and equipment will be co-ordinated and, if possible, presented in the form of a publication. So rapid has been the growth and development of street lighting during recent years that such a publication is bound to prove immensely valuable.

The forest resources of California have been placed in jeopardy as the result of the action taken by the new State administration in cutting out of the bud-

California's Forest Resources in Jeopardy

get all funds necessary to maintain fire prevention and suppression work, the tree planting program and the redwood park maintenance. District Forester

Paul G. Redington of the United States Forest Service, in a statement recently issued from his headquarters in San Francisco, calls particular attention to the marked difference in attitude toward forest conservation as shown by President Harding in his recent address and by the authorities of California. Mr. Redington says:

"California, up to this time, has recorded a progress in forestry and fire protection matters that has received not only the most favorable nation-wide comment, but has been given unqualified support by the citizens of the State. The need for fire protection and forest preservation is now recognized by 33 of our leading states, all of which make appropriations for this important work. Pennsylvania, which has approximately the same area of watersheds and forested land as California, exclusive of its National Forests, spends more than \$500,000 annually for fire protection and timber conservation.

"With other citizens of the State I heartily appreciate the need for keeping the expense of State government within the income, but I am sure that a reduction in State forest funds which did not wipe out the essential fire production work would have met with no great objection from the taxpayers.

"The Federal forest officials, working under incentive given by the President's encouraging statement, will continue to do everything within their power to deliver efficient fire protection to the National Forests. We have no authority, however, to extend our fire protection activities outside of the National Forest boundaries. The withdrawal of State cooperation in this important work will naturally hamper us greatly, since the two organizations were effectively working together. By such action California will also fail to share in the great National campaign so forcefully urged by President Harding for the more adequate protection of our dwindling forest resources."

The majority of the people of the state are bound to agree with Mr. Redington, especially when they realize that the budget reduction not only means a discontinuance of State activities in the vital matter of State activities in the vital matter of fire protection, but also acts to preclude the allotment of Federal, county and other cooperative funds in excess of \$100,000 annually. It would seem state authorities in their zeal for economy have exceeded the bounds of good judgment in this particular instance.

The merger of the 120 railroads of Great Britain into four great systems on Jan. 1, 1923, will, according to Sir Eric Geddes, result in an annual saving of approximately £20,000,000, or \$100,000,000. In all Great Britain there are but 23,000 miles of railroads, yet by following out a simple plan of consolidation, unheard of economies have been effected. In a recent issue of "Commerce and Finance" (N. Y.) it has been estimated that should the railroads of the United States be consolidated along similar lines, as is outlined in the Transportation Act of 1920, the annual savings would approximate a billion dollars.

The four big systems of Great Britain, which have been operating for two months, consist of the following:

| | Miles | Capital |
|---------------------------------|-------|--------------|
| Great Western | 3,753 | £136,500,000 |
| Southern | 2,200 | 145,000,000 |
| London & Northeastern..... | 6,464 | 348,000,000 |
| London, Midland & Scottish..... | 7,464 | 430,000,000 |

There is in the United States more than ten times the railroad mileage of Great Britain. The mergers which have been effected in that country simply bear out the contention of American economic experts that some such plan must eventually be followed out in this country. This constructive step taken by the British in the solution of their transportation difficulties has set an example for the Interstate Commerce Commission to follow.

Early developments in the spring political campaign in Denver indicate that municipal ownership of public utilities will be one of the chief planks in the platform of several mayoralty candidates. Under the present charter, party lines are eliminated but it is said that the election will be dominated by the established political groups and notably the democratic party, if the request of Governor William E. Sweet is observed.

A bombshell from the governor in the form of a statement that he will not favor any candidate for mayor in the municipal spring elections who does not stand for municipal ownership was presented to the Municipal Voters' league, a democratic organization, at its first formal meeting Feb. 16.

Governor Sweet's declaration of principles will raise the real issue for the coming campaign, it is believed, with the law and order fight already under

way taking second place. Particular reference to the desirability of public ownership of the Denver Tramway Company, the franchise for which expires in 1926, was made and the new issue is believed certain to command a prominent place in the campaign.

During the term of the next mayor, in addition to the tramway franchise, that of the Denver Gas & Electric Light Company will expire. With the telephone company exempt and the water system already controlled by a municipal non-partisan board, it would appear that the traction system will receive the initial attack, although in the hands of a receiver, with the Denver central station a close second.

Although directly interested in several central station properties, Governor Sweet in his letter did state that he preferred not to make an argument for municipal ownership, at the same time believing that regulation and control are positively unsuccessful.

This is the position assumed by Frank N. Briggs, prominent Denver banker, who has already announced his independent candidacy for mayor and who the same evening addressed the local chapter of the American Institute of Electrical Engineers on the "Possibility of Denver as an Electrical City."

In spite of the fact that he was talking to a number of the engineers now connected with the operation of public service corporations in Denver, Mr. Briggs advanced his own ideas as to the more complete utilization of water in connection with the municipal water works system as a source of cheaper power for Denver.

Simultaneous with the opening campaign on the public utilities, A. E. Barker of Denver received considerable attention in one of the newspapers there because of his defense of the municipal traction systems in San Francisco, recommending similar methods to be employed in Denver providing the support of the next city administration could be secured. In his statement he challenged a refutation by the Rocky Mountain Committee on Public Utility Information.

Many years have elapsed since a fight was waged against the public service corporations in Denver and with the fuse having been re-kindled an energetic campaign is expected during the next three months, the results of which will determine the character and intensity of the battle to be waged in the next couple of years looking towards the securing of new franchises.

There are some points on which the path of progress of electric brass furnaces is fairly clear, states the Bureau of Mines in a recently issued bulletin.

| | |
|--|--|
| Future of Electric Brass Furnaces | Mechanical refinements, use of automatic electrode control in batteries of arc furnace, and a slow but general improvement in life of refractories may be looked for as experience is gained. There are, however, many points of interest on which there is not yet enough collected experience to allow prediction. The electric furnace has not yet displaced the fuel-fired furnace from the field, nor will it do so completely in the near future, if ever. |
|--|--|

DISCUSSION



Hold Commerce Figures Do Not Represent True Measure for Different Ports

To the Editor:

Sir: We cut out of a recent issue of your journal a clipping relative to the importance of the Pacific Coast ports, which showed them in the order of San Francisco, Portland and Seattle, as I recollect. I am enclosing a letter we received from the Port of Seattle.

Port of Seattle,
Seattle,
United States of America.

January 17, 1923.

Greene Electric Furnace Co.,
1206 Hoge Building,
Seattle, Wash.

Attention Mr. A. E. Greene.

Dear Sir: Your letter of Jan. 11th, 1923, received with clippings with reference to cargoes cleared and entered at the different ports. This matter has been under discussion by the Port of Seattle for some time with the result that a complaint was forwarded to Mr. A. D. Lasker, Chairman of the U. S. Shipping Board. I am enclosing copy of data which appeared in the Port of Seattle Bulletin, which was practically the same as was sent to Mr. Lasker; also copy of Mr. Lasker's reply to the Port Commission, which is self-explanatory.

I also wish to call to your attention figures on the value of imports and exports through the Oregon Customs District, of which Portland is the chief port, and the Washington Customs District, of which Seattle is the chief port:—

Washington District—Seattle Chief Port

| | | |
|-------------------|---------------|----------------------|
| Value of Imports, | \$138,373,707 | |
| Value of Exports, | 61,575,667 | Total, \$199,949,374 |

Oregon Customs District—Portland Chief Port

| | | |
|-------------------|--------------|---------------------|
| Value of Imports, | \$ 5,244,300 | |
| Value of Exports, | 30,605,901 | Total, \$35,850,201 |

You can readily see from these figures, the relative importance as between Portland and Seattle.

Very truly yours,

[Signed] H. W. DAVIES,
Assistant Secretary.

STATISTICS OF CLEARANCES AND CARGO TONNAGE

"The Bureau of Research of the U. S. Shipping Board recently issued a circular showing clearance and tonnage through the principal ports of the United States. These statistics are manifestly unfair, especially in Seattle and the ports of Puget Sound. In case of outgoing cargo, vessels going to South America, Europe, etc., first take on a large part of their cargo in Puget Sound ports, eventually sailing from the California or Oregon ports, the latter receiving credit for the entire tonnage of vessel besides the clearance of vessel.

"In the case of inbound cargo, vessels arriving at Pacific Coast ports from these foreign countries, discharge a small part of their cargo at a California port, the latter receiving full credit for the entire tonnage of vessel, although a large part of cargo is discharged at Puget Sound ports, particularly

at Seattle, the principal northern port."—Port of Seattle Bulletin.

UNITED STATES SHIPPING BOARD,
WASHINGTON,

Dec. 22, 1922.

Port of Seattle Commission,
Seattle, Washington.

Dears Sirs: I have for acknowledgment your letter of December 13, 1922, taking exception to certain statistics recently published by the Bureau of Research, United States Shipping Board. You very clearly and correctly state why these figures are misrepresentative if taken as a true measure of the commerce of the individual ports.

May I quote as an explanation an extract contained in this release:

"It was not possible to secure the information for the year 1921 relative to individual port transactions of cargoes loaded and discharged in foreign trade; the comparison must therefore be made on the basis of the earlier report, in order to be of value."

The purpose of this particular release was simply comparison. Unfortunately, the system followed before I came to the Board was that of which you so rightfully complain. For comparative purposes, however, it was necessary, as explained, to state our figures for this year in the same manner as they had previously been stated. I fully agree with the objection to this method, and for your own information, I had already instructed that this system be discontinued and that a new one be set up which would show actual transactions of the individual ports. The Bureau of Research has under preparation such a statement for the fiscal year, 1922.

The Shipping Board is not dependent upon other departments for the sending of its data. The data that we are gathering reflects for the first time the actual movement on board ship in terms of weight so that shipping organizations might use them as a basis for plans for the future. With the improved system, which we have some time previously put into effect, we feel certain that these figures will be of greater value and will remove any cause for complaint from the standpoint of unfairness to any ports.

I appreciate your courtesy in bringing this matter to my attention and feel certain that this explanation will make our position clear to you.

Yours very truly,

[Signed] A. D. LASKER,
Chairman.

I thought this letter might interest you as it indicates Seattle considerably ahead of Portland.

ALBERT E. GREENE,
Seattle, Wash.
Feb. 3, 1923.

Additions and Corrections Noted in Listing of Hydroelectric Plants

To the Editor:

Sir: We enclose herewith list of 43 western hydroelectric plants not noted in the very interesting compilation in the Feb. 1 issue of the "Journal." We

of course realize that it is impossible or at least undesirable to attempt making a complete list, and it is also questionable just where to draw the line in capacity of plants, particularly as a 100-kw. plant in the early nineties is more worthy of notice than a much larger plant at the present time.

It may perhaps also be of interest to note that the turbines for all of these plants, with one exception, were manufactured by the Pelton Water Wheel Co. or by companies since absorbed by it. The exception is the plant of the Seattle-Tacoma Power Co. equipped in 1910 by the I. P. Morris Co., now associated with the Pelton Water Wheel Co.

A. T. PARSONS,

San Francisco,
Feb. 16, 1923.

Advertising Manager,
The Pelton Water Wheel Co.

Aspen, Colorado, Had Hydroelectric Central Station in 1885

To the Editor:

Sir: It seems to me that Mr. Gallison's article "Thirty-four Years of Hydroelectric Development in the West" should go back a few years further, so as to include the first hydroelectric plants of the Roaring Fork Electric Light & Power Company, and its predecessors.

Please see, in the "Journal of Electricity" for Jan. 15, 1919, an illustrated description of the early work of these companies. You will note that the city of Aspen was supplied with arc lights for its streets and business houses in 1885, with incandescent lights on the Edison three-wire system in the spring of 1887, and that 500-volt, direct current power was furnished to the mines in 1888.

As the light and power was generated in hydroelectric plants, I do not see that, as stated in Mr. Britton's article, "California was the pioneer of the entire world in hydroelectric development of electricity for commercial purposes."

C. E. DOOLITTLE, Vice-Pres.,

Aspen, Colo.
Feb. 9, 1923.

Roaring Fork Electric Light
& Power Company.

Outlook for the Electrical Contractor-Dealer for the Coming Year

To the Editor:

Sir: In your recent letter you asked—

- 1—What can the contractor do to get his share of the prosperity which 1923 promises?
- 2—How can the contractor-dealer play a leading part in the spreading of the electrical home idea?
- 3—How can the evil of destructive competition be overcome?

All three queries can be answered by the word WORK, but as you say, 1923 only holds out promises, hence speaking individually and unofficially, don't let us "Coue" ourselves into imagining something is, that isn't.

I feel that until the more important of the national and international questions of finance, economy, selfishness and self interests are well in hand, prosperity in its true form will be somewhat late in arriving on the scene.

While during the past year the building program showed an increase, and more activity than for

several years previous, it is indeed a lamentable fact that during this same period more electrical contractor-dealers, either failed, were placed in receivers' hands or carried by creditors, than for some years.

Such condition is not my idea of real healthy or healthful prosperity and would seem to indicate an unnatural and unhealthy condition in the industry, the responsibility for the diagnosis and cure of which, in a broad-minded, unselfish manner with self interest ideas omitted, rests not alone upon the retailer but upon every branch of the industry, and pending the discovery and application of the remedy other developments and minor problems with their incidental selfish interest objectives naturally, will have to be delayed for a time at least.

In view of price competition conditions as they have existed and no doubt will continue to exist, my only suggestion is the selling of our individual personality and service, for it has been my observation and experience that those in this industry who have pursued this course are the ones who are progressing.

E. E. BROWNE,

Pres. California State Association of
Electrical Contractors and Dealers.

San Francisco,
Jan. 10, 1923.

[Editor's Note.—The above communication is a reply to a questionnaire, extracts of which were published in the issue of Feb. 1.]

A Plea to Cleaner Manufacturers to Play Fair with the Humble Broom

To the Editor:

Sir: We take exceptions to a statement made in a recent issue of your Journal under the heading "Western Progress." You make this statement: "From the Dull Worrisome Monotony of the Broom to the Electric Vacuum Cleaner."

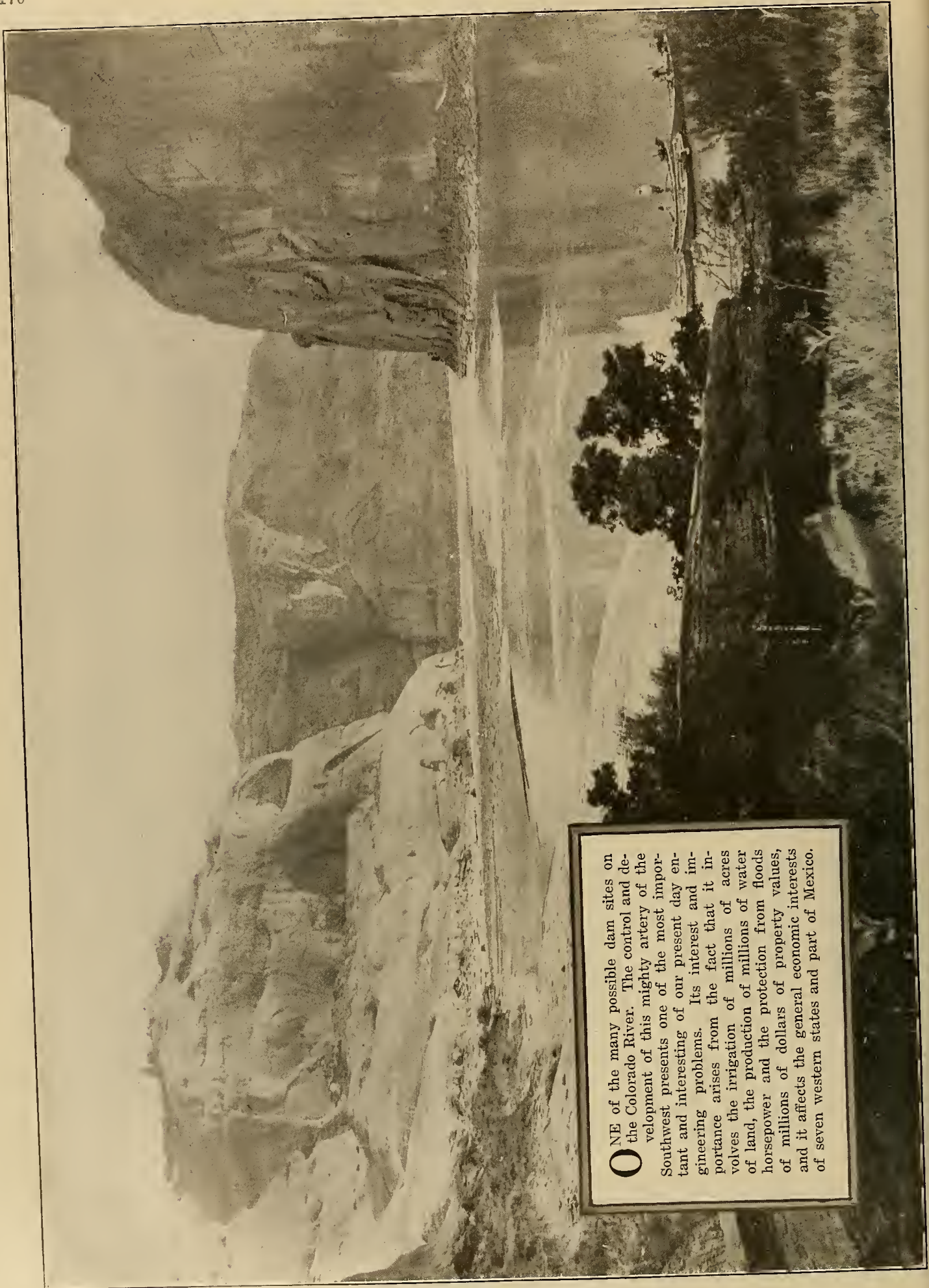
The vacuum cleaner has its place. Thanks to the invention. The broom has its place. The broom is not likely to replace the vacuum cleaner, and the vacuum cleaner will never put the good old broom out of business, notwithstanding the fact that it has been cussed, discussed, and misrepresented by practically every vacuum cleaner concern in the country. It's only recently that the different vacuum cleaner concerns could find enough good talking points about their machines that they could get out an ad without going to extremes in their condemning of the broom. You can go into any home—any store building—any warehouse, in fact wherever you go you will find the broom. It is the only cleaning device that from garret to cellar—from the front porch to the back porch, will go into every nook and corner, every hallway, closet, and stairway, and do a decent job of cleaning with one operation, so why do you in your advertising want to come out against an article that is of such value and importance?

We manufacture brooms, and lots of them, and yet we have vacuum cleaners in our homes, and will wager dollars to doughnuts that you, and every cleaner manufacturer has a broom in his home, as no home can be kept spick and span without a good broom, so why not play fair in your advertising?

D. ARBAUGH, Manager,

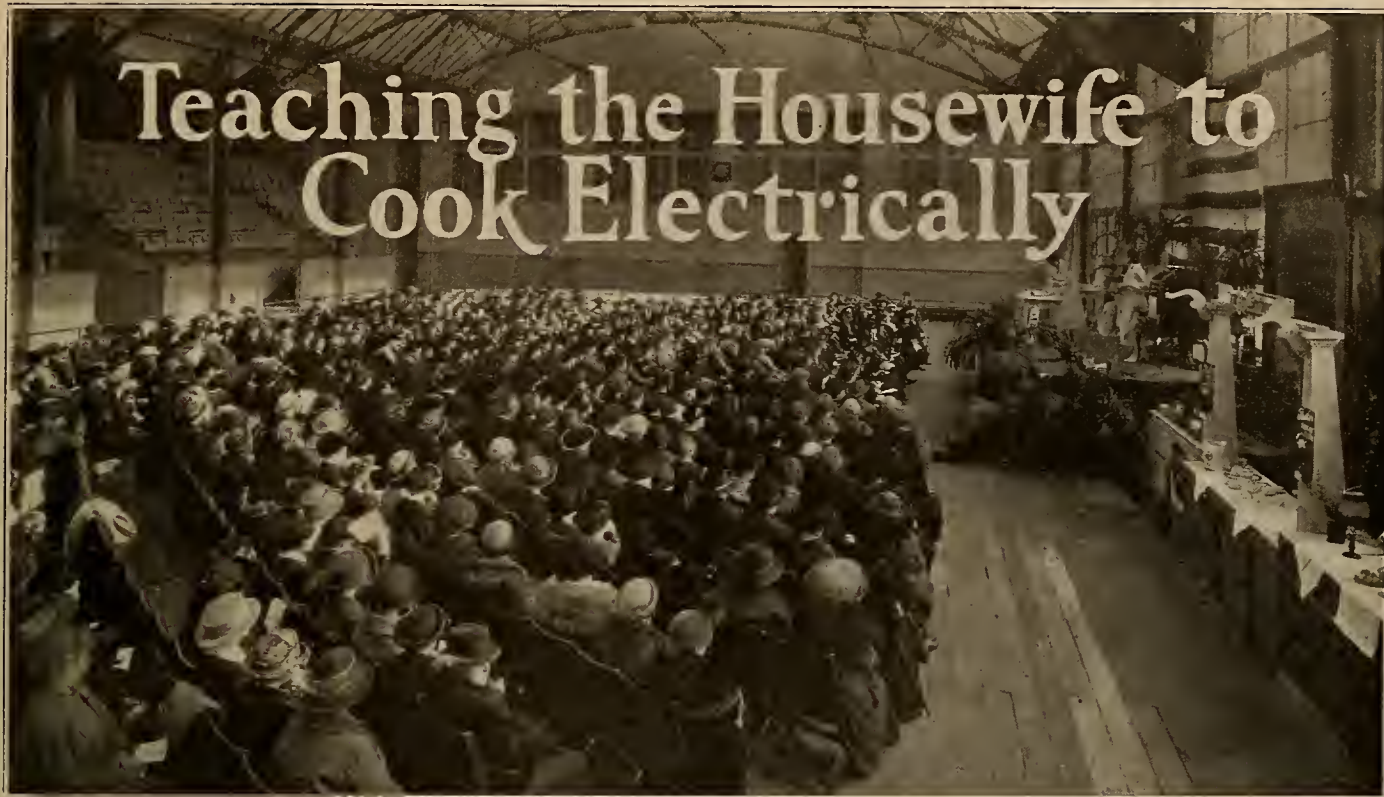
Pueblo, Colo.,
Jan. 29, 1923.

National Broom Mfg. Co.



ONE of the many possible dam sites on the Colorado River. The control and development of this mighty artery of the Southwest presents one of the most important and interesting of our present day engineering problems. Its interest and importance arises from the fact that it involves the irrigation of millions of acres of land, the production of millions of water horsepower and the protection from floods of millions of dollars of property values, and it affects the general economic interests of seven western states and part of Mexico.

Teaching the Housewife to Cook Electrically



TWENTY-EIGHT years ago the Lord Mayor of London sat down to an electrically cooked banquet in the Cannon Street Hotel, a banquet which culminated a series of experiments in electric cookery which began in England in 1890. The banquet was pronounced highly successful, both from an electrical and a gastronomical standpoint, and considerable interest was aroused. However, it was not until 1909 that American manufacturers perfected an electric range which would not only cook, but which would function dependably. Since that time these manufacturers have developed the most perfect cooking device in the world and one whose supremacy over other types of household cooking devices cannot be contested.

While the art of cookery is as old as civilization itself, in the evolution of its methods, the application, generation and utilization of the heat has depended upon the supply and the cost of the successive fuels, the problem of changing cooking methods which have been practised for years is no easy task. Although the multiple advantages of cooking by electricity—cleanliness, convenience, ease of control, conservation of heat, safety, simplicity of operation—are self-evident, the housewife who has been brought up to use other cooking devices requires more than a strong sales argument to win her over. She must be given a liberal education in the art, science and compensating advantages of electric cookery.

By Ray W. Turnbull*

***B**Y means of a series of electric cooking schools held in conjunction with the newspapers of the Northwest, the Edison Electric Appliance Company, has directed the attention of 10,000 housewives to the many advantages of the electric range.*

Manufacturers of electric ranges, central stations and others who are interested in the increased use of electricity as a cooking medium have devised various methods for telling their story of these compensating advantages to the housewife. There have been electric range demonstrations, there have been publicity campaigns and the advantages of the electric range have been called to her attention through advertisements of every nature and description. Chief among the methods which have been devised for telling this story has been the electric cooking school. It has remained for the Edison Electric Appliance Company to effectively demonstrate the value of this idea in a series of schools conducted for the benefit of the general public throughout the Pacific Northwest during the latter part of 1922.

Cooperating with a Newspaper

The electric cooking message was brought directly to the attention of over 10,000 housewives in Seattle, Tacoma, Spokane and Portland, and indirectly to the attention of those in 200,000 homes as a result of four such public cooking schools staged in collaboration with the leading newspapers in each of those communities. The methods employed and the benefits derived will be of interest in every community where an attempt is being made to popularize the use of the electric range.

The first essential for such a school is a capable demonstrator and home economist. In this case Miss Bernice Lowen, official home economist of the Edison

*Northwest District Manager, Edison Electric Appliance Co., Inc.

Electric Appliance Company's Chicago office, was specially secured for the schools. The woman who conducts the school must have a pleasing personality, she must be a good speaker and she must not only be familiar with every phase of culinary art, but also know the many advantages of electrical cookery and be familiar with the superior features of the range which she is using in her demonstrations.

Securing the cooperation of the newspaper is not a difficult task. The added prestige which it will secure in the community as a result of the undertaking, the increased revenue due to advertising and the general appeal which will be aroused offer sufficient ammunition for selling the idea to the newspaper publisher.

Cooperation from the local merchants is an essential factor in the success of the cooking school. Since they are the ones who must furnish the major portion of the advertising space, they must be thoroughly sold on the idea. When the benefits to be derived from the publicity connected with the lectures are pointed out, there is little difficulty in securing their cooperation. As the process of cooking requires the utilization of foodstuffs of every description, the number of merchants who can be approached is innumerable. In the schools conducted in the Northwest, hearty cooperation was secured from the electrical industry, as shown by the accompanying samples of some of the newspaper advertising which appeared in the special section devoted to the cooking school. In each case there was at least one full page of advertising every day while the school was in progress. Central stations cooperated to the fullest extent as they were cognizant of the benefits to be derived from any increase in the range load on their lines.

Baking Contests a Feature

A feature of the schools conducted by the Edison Electric Appliance Company were the baking contests in which all of the women were invited to participate. These contests were divided into three classes, one for bread, one for cakes and one for pies. The number of entries ranged from 620 in Portland to 1,164 in Tacoma. Interest in the contests, which were held on the last day of the school, was focused on the prizes which consisted of a Hotpoint Super-Automatic range for first prize in the bread baking contest, an electric washing machine for the best cake submitted and a vacuum cleaner for the successful entry in the pie baking contest. Other prizes were furnished by the various participants in the advertising display. An idea of the awards can be gained from the following list, which represented the prizes given in Portland:

Bread-baking Contest

1. Hotpoint-Hughes Super-Automatic electric range.
2. Three 49-pound sacks Olympic flour.
3. Thirty-two cans Carnation milk.
4. Six 2½-lb. cans Calumet baking powder.
4. One package assorted Golden West "Just-Right" products.
6. Order for one dozen cans President brand solid pack tomatoes, from Sealy-Dresser Co.
7. Order for 5 pounds Red Rock cottage cheese.

Cake-baking Contest

1. Thor No. 32 electric washing machine.
2. Three 49-pound sacks Olympic flour.
3. Thirty-two cans Carnation milk.
4. Six 2½-lb. cans Calumet baking powder.
5. One package assorted Golden West "Just-Right" products.
6. Order for two rib roasts from Parker's market.
7. Order for five pounds Red Rock cottage cheese.

Pie-baking Contest

1. Torrington vacuum cleaner.
2. Three 49-pound sacks Olympic flour.
3. Thirty-two cans Carnation milk.
4. Six 2½-lb. cans Calumet baking powder.
5. One package assorted Golden West "Just-Right" products.
6. Order for five pounds Red Rock cottage cheese.

The rules governing the baking contests were strictly enforced. The judges consisted of two bakers and a flour company chemist. The entries were judged by the standard scale adopted by the baker's association. It is interesting to note that the loaf of bread which scored the highest number of points in any of the four schools, was but 83 per cent perfect. As a guide for future contests of this sort, the rules enforced in Portland are reprinted below:

1. Any girl or woman in Portland, except professional cooks or bakers or employees of The Oregonian and their families, may enter the contest.
2. The articles entered in competition are to be baked at home. They may be baked in any kind of stove or range. All entries are to be delivered at the Woman's Club building, 448 Taylor Street, between 10 a.m. and 12 m. Friday, Dec. 8.
3. In baking any kind of bread, cake or pies for entry in the contest, only the products advertised in connection with the cooking school may be used.
4. Any kind of bread, cake or pie may be submitted.
5. Any contestant bringing an entry or entries to the contest will be responsible for its or their safe delivery.
6. Articles entered will not be returned, but will be sold by the Portland Woman's Club for the benefit of their building fund.
7. Each contestant will be given a number and corresponding numbers will be placed on the entries in order that the judges may not know the names of the contestants.
8. Decision of the judges selected by The Oregonian will be final.
9. No entry cards are necessary until the articles are brought to the judges Friday morning.
10. A contestant may enter in all three divisions if she so desires, but only one entry may be made in any one division.

Among the highlights of the contest were the entry of fourteen loaves of baker's bread in one city and the entry of a mince pie in another which smacked of the kind grandmother used to make before Mr. Volstead became a member of Congress. Needless to say the pie took a prize, third in this case, and the judges sampled every other mince pie entered.

Further interest in the baking contests was aroused by the auctioning of the entries for charity. Considerable money was raised in this manner.

Benefits Which Accrue

The benefits accruing from such cooking schools are not all tangible. While there was an actual stimulation of sales which was immediately appreciable,



The
housewife
proved
a
willing
subject
for
lessons
in
electric
cookery



Much of the success of the cooking school depends upon the demonstrator. Miss Bernice Lowen, the Edison Electric Appliance Company's home economist, gave the lectures in the Northwest. The photograph on the left is the one which was used in the front page spread inviting the women to attend the school. Above is the Portland school.



The stage in the Crystal Pool Palace in Seattle was arranged like a kitchen. All of the appliances which were given as prizes were displayed prominently. Note the question box in the foreground, an important feature in connection with the lectures. The questions were announced each day.

the full effect will not be felt within a year. One of the most noticeable effects was the installation of an electric range department in one of the largest department stores in Seattle and the opening of a cooking school by this store immediately following the one conducted by the newspaper. The store's lectures attracted 500 women daily.

The publicity appearing in the columns of the newspapers, both previous to and during the period of the lectures, would have cost the manufacturers and merchants who took part thousands of dollars had an equivalent amount of advertising space been purchased. Add to this publicity, the motion pictures which were taken by a news reel in Seattle and displayed for a week following in the local theater. In Portland the demonstrator, Miss Lowen, broadcasted a lecture on electric cooking from the radio station of The Oregonian which was heard by approximately 50,000 people.

Just how effective the cooking school idea is in educating the public is shown in the following figures on the lectures:

Seattle: Paper, Times. Number of days, 5. Attendance, 1,000 average; 1,500 maximum. Entries in baking contest, 987. Recipient of proceeds from sale of contest entries, Kiwanis Club Orthopedic Hospital.

Spokane: Paper, Chronicle. Number of days, 5. Attendance, 500 average; 650 maximum. Entries in baking contest, 627. Recipient of proceeds from sale of contest entries, Associated Charities.

Tacoma: Paper, News-Tribune. Number of days, 5. Attendance, 1,200 average; 1,400 maximum. Entries in baking contest, 1,164. Recipient of proceeds from contest series, Elks' Christmas Fund.

Portland: Paper, Oregonian. Number of days, 5. Attendance, 600 daily. (In Portland the largest lecture hall obtainable was the Woman's Club which has a seating capacity of but 600. On the opening day 400 women were turned away.) Entries in the baking contest, 620. Recipient of proceeds from sale of contest entries, Woman's Club Building Fund.

The electric range is here to stay. Its success is proven and its increased use depends upon the concentrated efforts of the electrical industry to educate the modern housewife in its conveniences and advantages. The means which are employed to perform this task or the participants in the campaign of education are immaterial. It is a problem which requires concentration and cooperation and there are few better ways of popularizing the use of the electric range than to demonstrate its advantages to the housewife by teaching her the principles of electric cookery.

The Name that Means Correct Electric Cooking

THE name "HOTPOINT HUGHES" has come to suggest supremacy in electric cookery— which means perfect cookery. Every element of convenience, comfort, cleanliness, accuracy and superb operation which could be built into an electrical appliance has been developed to its finest point in the

Hotpoint HUGHES ELECTRIC RANGE

The Hotpoint Hughes is more than a kitchen range; it is a perfect electrical appliance for preparing food in complete comfort and under entirely sanitary conditions. Its scientific application of heat frees the housewife from the care and attention ordinarily demanded by cooking, and assures her of food perfectly cooked, without shrinkage and without loss of flavor. Hotpoint Hughes means safety from open flame and a cleanliness that is impossible in other forms of cooking. Inquire about our special cooking rate.

See
The Torrington Vac
which Miss Lowen has chosen for first prize in the Pie Baking Contest
E. L. KNIGHT & CO.
Washington Street, Near 12th
We have the finest display of Lighting Fixtures in the city.

Thor No. 32 Electric Washer

Let us show you the

Thor No. 32 Electric Washer

which Miss Lowen has chosen for 1st Prize in Cake-Baking Contest.

Terms to Suit
We sell Hotpoint Hughes Ranges

Smith-McCoy Electric Co.
264 Alder Street between 3d and 4th

PAPER TO OPEN UP SCHOOL OF COOKING

The Oregonian to Give Prize to Best Breadmaker.

ELECTRIC STOVE AWARD

Expert From Chicago to Inspect Portland Women From December 4 to 8.

Portland Railway Light & P.
Alder Near Broadway
ELECTRIC STORE

Miss Lowen says the Thor No. 32 electric washer is the finest machine made. See it at The Oregonian cooking school or at the following dealers:

Smith-McCoy Co.
E. L. Knight Co.
Morrison Electric Co.

Grand Electric Co.
M. J. Walsh & Co.
Portland Railway, Light & Power Co.

Lighting Fixtures
Hot-Point Hughes Ranges
Thor Washers
East Side Agency
GRAND ELECTRIC CO.
127 Grand Avenue

OREGONIAN COOKING SCHOOL

MENU
Monday, December 4th, 2 to 4 P. M.
Lightning Tea Cakes Porcupine Apples
Currant Tea Ring Baked Potatoes
Omelet
Peanut Butter Rolls
Broiled Beef

Musical Programme 1:30 to 2 P. M.
Selections on the Duo Art Reproducing piano played by such artists as Alfred Cortot, Josef Hofmann, I. Paderewski, Harold Bauer, Percy Grainger and others.
High-class vocal selections by Miss Alice Lavina Andrews by such composers as Saint-Saens, Chopin-Liszt, Beethoven, Strauss, Schubert and others.

THIS IS LAST DAY OF COOKING SCHOOL

Exercises Marking End of Term Arranged.

CONTEST IS ANNOUNCED

OREGONIAN COOKING SCHOOL NOW READY

Domestic Science Teacher of Chicago in Charge.

KEEN INTEREST AROUSED

For Xmas

The prizes offered at the Oregonian Electric Cooking School are timely.

The occasion gives every housewife in Portland an opportunity to secure the electric range that Miss Lowen, Home Economist and Lecturer, is using in all her demonstrations at the Electric Cooking School—the kind of electric range prize in baking contests—and she always selects as first the kind we have recommended and sold since its inception—a super-automatic

Hotpoint HUGHES ELECTRIC RANGE

And, in case you should not win this range, which is the first prize offered, you may secure one of the other two prizes offered for electric baking. A complete line of electric ranges is displayed at our Cook-by-Wire Store, Washington at Tenth, at prices to suit your wishes and at terms to suit your convenience. Inquire about our special cooking rate.

Northwestern Electric Company
Broadway 0580
Light — Power — Heat
Washington at Tenth

The manner in which the electrical industry cooperated in the cooking schools is shown in the above samples of some of the newspaper advertising. Some idea of the publicity used in the news columns in Portland can be gained from the clippings.

Financial Relations of the Jobber with His Customers

IN considering the financial relations of the electrical jobber with his customers, let us first group his customers. Broadly speaking, they fall into four general classes, public utilities (principally power companies), industries, government agencies and contractor-dealers. The problems of credit extension in relation to the first three classes is comparatively simple, based as it is almost entirely upon financial

responsibility as reflected by balance sheets. Other financial relations depend upon arrangements as to terms of payment which offer little or no ground for anything but pleasant relations, since understandings are clearly defined and since these classes of customers are usually so organized that the carrying out of arrangements of purchase and payment are routinized, entrusted to efficiently operated departments. It is in his relations with contractor-dealers that the jobber's real financial problems are met and as this class of customers usually gives him a very substantial part of his total volume of business, these problems are of paramount importance and in their solution it is helpful, not to say necessary, that there be mutual understanding and willing, constructive cooperation, upon which goodwill alone can be permanently founded.

Not so many years ago it was the rule, rather than the exception, for an electrical contractor to enter business with a very limited capital. The jobber was expected to carry accounts for many months, often until jobs containing the material he sold had been completed and paid for, receiving little or nothing from the contractor's progress payments. Thus he actually financed both labor, material and overhead and assumed not only the credit risk of his customer but also of his customer's customer. This practice was unsound. It encouraged incompetence. Since bookkeeping methods were crude and accurate knowledge of the standing of the business often was entirely lacking, it frequently permitted the continuance of operations at a loss until a day of reckoning came—when bills had to be paid or credit accommodations withdrawn. At this time assets were frequently found to be insufficient and capital impaired. Losses suffered by the jobber as a consequence are a matter of record. They were large. They forced the adoption of more rigid but more scientific methods of credit extension to the benefit not only of the jobber but even more so to the whole branch of the industry represented by the contractor-dealer,

By S. B. Anderson
Treasurer of Pacific States Electric Company, San Francisco

"CREDIT," says Mr. Anderson, **"must be considered a convenience in the conduct of the business of the contractor-dealer, not in any sense a financial assistance to take the place of capital. If a business is well managed capital can readily be secured from other sources."**

tending as it did to eliminate the incompetent and his good-will-destroying competition and to raise standards.

Just as there are fundamental requirements in producing an excellent electrical installation, good workmanship, standard materials, for which the public is expected and willing to pay a fair price, so there are certain fundamental principles in the granting of credit which are a guid-

ance to every efficient credit man. These principles are crystallized in the so-called three "C's" which we hear of so often—CHARACTER—CAPACITY—CAPITAL. Character needs no further elaboration. We all understand what it is and its significance. Capacity means knowledge; an understanding of the principles of inspiring and guiding men in their work,—ability. Without character and capacity no business, no matter how well financed, can long succeed. Character and capacity produce and increase capital. Capital, when employed with the other two qualities lacking, will certainly diminish.

Giving the Contractor-Dealer a Credit Rating

In considering a contractor-dealer customer for a credit rating, the credit man must, of course, be convinced first as to his potential capital producing qualifications, the possession of character and capacity, but in addition he must also be satisfied as to capital. I have already pointed out that long credit for merchandise from a jobber in the place of capital furnished by the owner of the business has been proven unsound, and must be discouraged. The jobber performs a function in the plan of distribution from the manufacturer to the consumer, which requires large investments in merchandise, in order to be able to serve his customers promptly. His rate of gross profit is limited by the character of the service which he performs in the scheme of distribution. As the expense of doing business, even under the most efficient management, approaches this rate of profit very closely, he depends for his net profit largely upon rapid turnover of his capital. When his merchandise is supplied to his customers he must, therefore, expect prompt payments as he cannot secure a satisfactory turnover of capital if, in addition to his investments in merchandise, he also must carry long term accounts. The credit privilege must, therefore, be considered a **convenience** in the conduct of business, not in any sense a financial assistance to take the place of capital. Its advantages aside from its conveniences should be

found in the quality of service rendered and in the far-reaching benefits of advertising and other aids available to a customer in good credit standing.

Be Sure You Have Enough Capital

The relation between capital and volume of business is of great importance. This relation may be improved by good management and sound policies. It may become so bad as to cause failure. To have more capital available than volume of business warrants, is bad business. An attempt to do too large a volume of business on a limited capital is worse. Such attempts are unfair to competitors who may have capital unemployed, while yours is stretched to the breaking point, and this is not conducive to good-will relations which must exist among all branches and all members of the industry, if our ultimate object is to be attained of rendering the consumer a good-will producing service by which we may all profit. Among the principal causes of failures, incompetency ranks first, insufficient capital second. This is a matter of record. But a limited capital gradually, step by step—increased by profits from a growing volume—can be made to finance more business, by selection of the kind of work which ties up capital as little as possible, by special efforts to gain customers of good credit standing and by the prompt collection of accounts due from them. The credit man, in considering capital of a contractor-dealer customer as a basis for credit, therefore, looks less to the amount actually employed, or the financial responsibility as reflected by the balance sheet, but is more interested in profit and loss statements which determine whether the business is efficiently and profitably operated. He looks for rates of gross profit and expense. He looks for relations between merchandise stock and monthly sales. He scans accounts receivable most closely to determine their relation to monthly sales and their age, and upon these facts he bases his conclusions. If a business is well managed and shows satisfactory results in these essential relations, he is ready to extend the credit privilege for he knows that additional capital, as needed, can readily be secured either from increased investment by owners or temporarily by bank accommodations, and that his bills will, as a consequence, be paid promptly. If, on the other hand, satisfactory relations are lacking, he can find no basis for credit because the business cannot ultimately be successful.

Too much stress cannot be laid upon the importance, in the operation of a contractor-dealer business, in passing upon the credit responsibility of a customer and of concentrated effort in following collections. Short credits and prompt collections are the best possible means of increasing profits. The jobber who sets high standards of credit extension for his contractor-dealer customers and who collects his accounts promptly is performing a constructive service, because he encourages, possibly forces, the contractor-dealer to adopt similar sound methods in dealing with his own credit and collection problems. The jobber who extends credit lightly and for long terms, even though it be done in a desire to be help-

ful, is retarding the development of electrical contracting and merchandising. It is a mistake to think that insistence upon prompt payment of bills tends to destroy good-will of customers. "It is easier to collect an account soon than late," says Mr. Kennedy, a master and an authority on good-will relations, in "Winning the Public."

When a contractor-dealer operates at an expense rate which is reasonable, when his stocks of merchandise are in proper relation to sales, when his basis of credit extension is sound and his collections are followed closely, then he is in a position really to profit by the growing demand for quality installations and quality merchandise for which fair prices may be charged. He is then in a position to take advantage of the good-will which such business methods create, and disregard cheap competition, because he selects his own **quality** customers. Capital will then no longer be repelled but will be increasingly attracted to this important branch of the electrical industry.

Electrically Operated Well at Base of Point Firman Cliff

THERE is perhaps no other oil derrick anywhere in such an odd location as the one of the San Pedro-Point Firman Oil & Gas Company at the base of a 100-ft. bluff at San Pedro, Calif. All timbers, machinery and supplies for the derrick are lowered over the side of the cliff by an electric hoisting



Oil derrick and stiff-leg hoisting derrick installed at well No. 1 of the San Pedro-Point Firman Oil & Gas Company.

engine operating a stiff-leg derrick. The men working on the oil derrick go down to work in a cage electrically operated.

The derrick is set on a pier 40 ft. by 100 ft. which is within a foot of the ocean at high tide. The pier rests on solid shale formation and is anchored by bolts countersunk in the shale. All of the drilling machinery and pumping motors are operated by electricity which is transmitted to the site at 10,000 volts. This power is stepped-down by transformers located on the property. Flood and spot lights have been installed to permit the men to work at night.

Stimulate the Demand for Ornamental Street Lamp Installations

IN spite of the fact that proper street lighting has been found to reduce the number of accidents, the advance in the use of new lighting units has not been as rapid as the advance in other civic improvements. An authoritative national survey recently compiled shows that 17.6 per cent of the street traffic accidents occurring at night were attributable to lack of proper illumination. According to this survey nearly 600 fatalities are annually chargeable to this cause, and approximately \$54,000,000 of the annual street accident loss. At the same time it was reported that the total expenditure for street lighting in the United States was not in excess of \$50,000,000.

Since the survey covered a number of cities in which the streets were illuminated with varying degrees of effectiveness, this figure of 17.6 per cent may be considered to be a conservative indication of the value of illumination in the prevention of night accidents. Where the need for better street lighting is particularly urgent, the percentage of night accidents attributable to the lack of proper street lighting is likely to run as high as 50 per cent, according to the report. Where White Way lighting is used the number of accidents caused by poor illumination will run lower than the average found in this survey.

It is pertinent that while the expenditures for higher levels of artificial street illumination may be amply justified as an accident prevention measure, they can also easily be justified when the effect on the reduction of crime is taken into consideration. For example, a recent analysis of crimes occurring in the downtown district of Cleveland, Ohio, indicated that the installation of the White Way lighting system could be credited with having brought about a decrease of 8 per cent in the amount of crime on those particular streets while on the more poorly lighted streets there was an increase of 57 per cent.

The heavy financial demands for other much needed civic improvements, in the average American city, have made it difficult for many municipalities to provide the necessary funds for better street lighting. In recognition of this difficulty some states already have acts permitting improved street light-

ing to be assessed against property holders as in the case of paving and other necessary street improvements. Under this plan the contract for the installation and operation of the lighting can still be handled by the municipality itself, and this is very desirable to insure continuance of good service.

That improved street lighting is really needed over the entire country seems obvious. That it is economically practical has been established by experience in many progressive cities and towns.

For years it was almost the universal practice to have the contract charges for street lighting

based on a fixed charge per lamp per year which included allowance for carrying charges on the investment as well as the cost of operation and maintenance. However, in the case of White Way lighting, on account of the special investment necessary, the equipment has often been installed by the municipality and a separate contract entered into for the operation and maintenance of the system. This same practice appears to be growing in favor in the case of municipalities where ornamental installations are being made for the entire city. Proponents of this plan point out that the municipality, under this arrangement, has an unlimited choice in the selection of the type and design of standards and



These lighting standards are part of an exhibit prepared by a number of manufacturers of ornamental lamp standards, that civic bodies may see how the various types will appear when actually installed.

lamp equipment installed, and at the same time is in a position to secure favorable rates for maintenance and operation of the system since the contractor is not faced with the necessity of amortizing the investment during a relatively short contract period.

Cost of Street Lighting Is Low

The cost of street lighting per lamp post has not shown the same ratio of increase as other municipal safety services such as fire and police protection. As a matter of fact, the present average annual expenditure per capita for street lighting is less than \$1.00. This low figure, however, results from the circumstance that a great many municipalities have not revised their street lighting systems to make them adequate under the new and more severe requirements imposed by the greater hazards introduced by the universal adoption of automobile transportation. In many municipalities there is still barely one

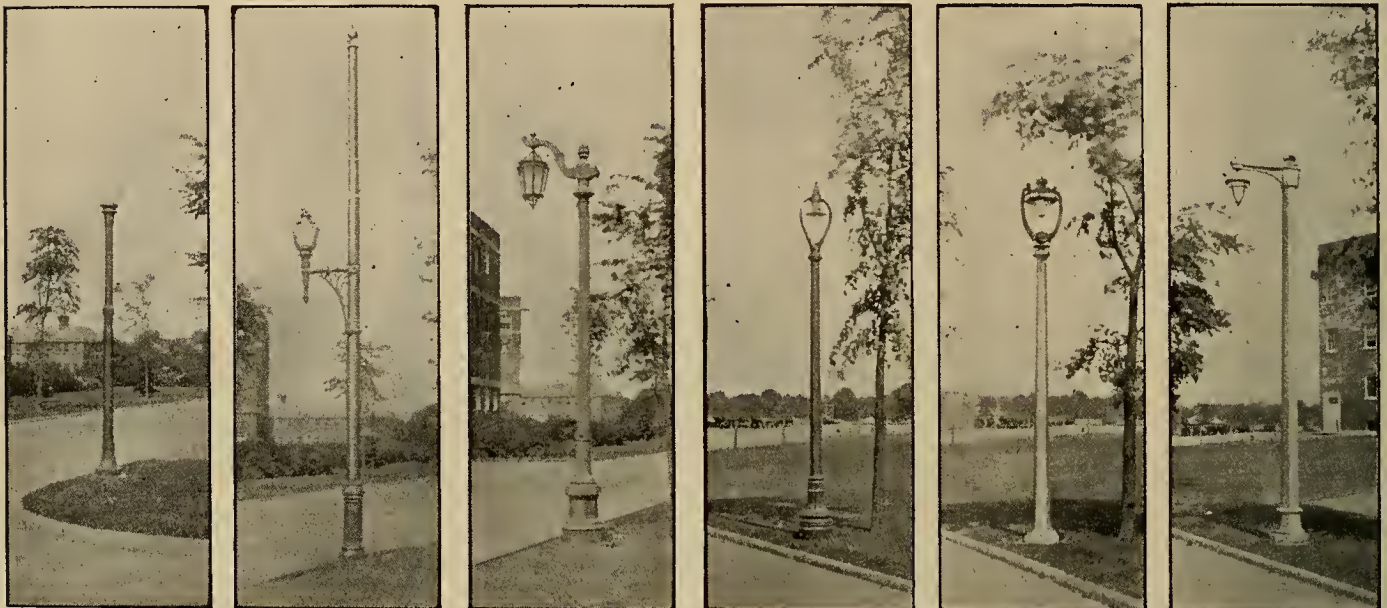
lamp for each street intersection. Such lighting was considered quite satisfactory 10 or 15 years ago in the days of horse drawn traffic, but now it is inadequate and unsatisfactory from the standpoint of sufficient illumination, and present day conception of proper street appearance.

The experience of a number of municipalities that have improved their lighting throughout the city to bring it in line with modern standards indicates that this can be done effectively at the modest cost of from \$1.50 to \$2.50 annually per capita. In most cases the latter figure makes possible the installation of an ornamental system throughout the city. In a comprehensive survey recently reported, the highest expenditure of any city was \$4.81 per capita per year. It should be pointed out, however, that comparisons of cost on a per-capita basis are likely to be misleading since there are such great

ally be handled much more economically before the streets have been paved, and before concrete drives have been laid.

One reason for the growing popularity of ornamental equipment for thoroughfare and residence streets has been the development of such units as retain the efficiency characteristic of well designed overhead pendent utilitarian units. Thus in addition to the familiar opal globe, there are now available a number of carefully worked out refracting and reflecting units, varied in contour and appearance, suitable for both upright and bracket mounting, which give a materially increased utilization of light on the street surface.

In the past there has been a wide diversity in practice as to the illumination of streets of the same character and importance in different municipalities. These variations have been due in part to differences



Six types of ornamental street lamps displayed at Nela Park, demonstrating the variety of standards available for cities wishing to reduce the number of accidents and crimes by more adequate street lighting and at the same time to add to the appearance of streets and boulevards.

variations in miles of paved street per thousand of population.

Ornamental lighting is rapidly becoming standard, not only for business districts and parks, but for thoroughfares and residential streets throughout the area of the city. While, of course, in many cities the overhead wooden-pole mast-arm or the center suspension is still being retained, this type of construction is coming to be regarded somewhat as a temporary or emergency measure which serves until arrangements can be made for suitable ornamental lighting.

It is noted that a very large number of new real estate subdivisions are being lighted by ornamental standards properly spaced before the lots are placed on sale. This is unquestionably a desirable practice, for not only are the property values increased by the absence of unsightly wooden pole construction on the streets, but it is also true that the underground circuit construction, erection of posts, etc., can usu-

ally be handled much more economically before the streets have been paved, and before concrete drives have been laid.

ally be handled much more economically before the streets have been paved, and before concrete drives have been laid.

ally be handled much more economically before the streets have been paved, and before concrete drives have been laid.

Manufacturers of lighting units have done a great deal to standardize the equipment to be used in street lighting programs and have in many instances been aided by central station companies. The possibilities for still further developing this field have not been removed and in many cities the opportunity of developing a good load for the central station and a remunerative installation order for the contractor-dealer are present to a greater extent than they have been in the past.

SILVERTON, Ouray and Telluride, served by The Western Colorado Power Company, are separated from each other by high mountain ranges. The accompanying views show an unusual accumulation of sleet on the transmission lines connecting these districts across the mountains at an elevation of 13,200 ft. The line is for the most part standard wood pole construction operating at 17,000 volts. Most of this system is in an altitude where long winters and heavy snows prevail, making necessary bracing and guying the poles. In bad places a combination of push guy with anchor guy along the top is common. Snow slides are frequent occurrences, making duplicate circuits essential. Often the snow reaches 10 ft. in depth and most of the lines are inaccessible except on snowshoes during the winter months.



THE Western Colorado Power Company has solved some very trying problems in the matter of construction and maintenance. Durango, the headquarters of this company, is the principal city in the great San Juan basin, an almost undeveloped empire in the southwest corner of Colorado. At present the principal load of the company is from mining operations, but it is situated tributary to a fertile agricultural section, which, though hampered by lack of transportation, will eventually become an important agricultural as well as mineral producing area. Plenty of water is available for irrigation in six rivers, and thousands of acres suitable for irrigation have been tested for various crops. In addition, coal fields in this region are large and practically untouched, containing various grades of coal, including anthracite.

ELECTRICITY IN INDUSTRY



By Louis F. Leurey
Industrial Electrical Engineer

Advanced Application of Electric Drive in Arizona Copper Mill

THE New Cornelia Copper Company, with H. Kenyon Burch of Los Angeles as consulting engineer, has now under construction a concentrator for copper ores at Ajo, Ariz., which when completed will undoubtedly prove to be one of the most advanced applications of electrical drive in the entire field of western industry.

This company has recently placed with the Westinghouse Electric & Manufacturing Company an order for approximately 250 motors, aggregating

a total of 9,300 hp. These motors are operating all classes of mechanical drive in this large concentrator and many of them are installed according to standard conventional methods of the various types of drive involved.

This plant will install four sets of 72-in. coarse grinding rolls. Under the older methods of driving these rolls, a single motor was used and two sets of belts, one being crossed, were installed to produce different rotation of each roll of the pair. Under the new method, a 100-hp. motor is connected to each roll. The stators of the two motors are then connected to each other and a push button contactor



Exterior view of the New Cornelia Copper Company's mill located at Ajo, Ariz. The mill is being overhauled and many new electrical features are to be installed on machines operating in the mill.

installed at the source of the supply. An accelerating relay is installed in the common leads to the motors and this relay actuates contactors which cut out steps of resistance on an individual resistor group attached to the rotor of each motor until the motor is within $12\frac{1}{2}$ per cent of full speed when operating under full torque conditions. The remaining section of resistance in each motor is controlled by an indi-

bringing of the roller mill gradually and evenly to speed.

It is stated that the cost of this installation is only slightly higher than that of the older method using the expensive Herring-bone gears and high speed motors, and takes full advantage of the inherent value of the synchronous motor for low speed operation and the incidental high power factor secured.

A further interesting point in connection with this installation is the installation of a common exciter bus for all synchronous motors with push button control for connecting these exciters to the bus.

In addition to the synchronous motors described above, there are five 275-hp. Westinghouse synchronous motors for driving the rotating blowers, but on account of their light starting duty they are not equipped with magnetic clutches. These motors are also started with a simple push button control.

As a final point of interest, and as an illustration of the flexibility and advantage of direct unit drive, this concentrator will have installed one hundred 1-hp. motors with totally enclosed back gearing

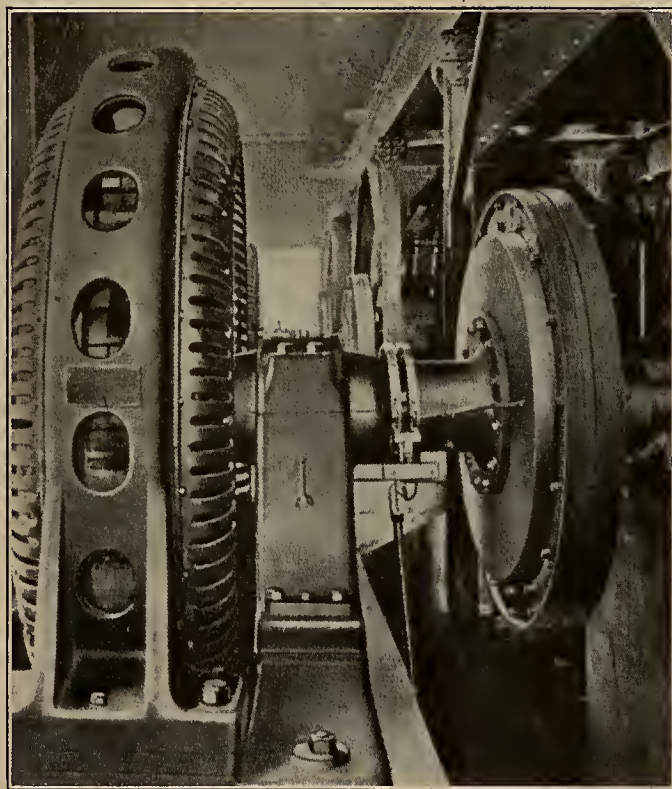


Ball mill floor in the mill of the Nevada Consolidated Copper Company, showing the old method of reducing the speed of electric motors through Herring-bone reduction gears. A double reduction in speed was secured by this gearing method.

vidual drum controller which thus allows the differential speed control of the two motors with a $12\frac{1}{2}$ per cent range under full load torque conditions.

The second installation in this concentrator which deserves special attention consists of twenty roller mills for fine grinding. These mills drive at very low speed and in the older methods the drive required a double reduction with Herring-bone gears to secure a reasonable speed on the driving motor. The new drive consists of twenty 175-hp. Westinghouse synchronous motors operating at 150 r.p.m. The shafts of these motors are connected to the shaft of the roller mills through a Cutler-Hammer magnetic clutch which permits the synchronous motor to be started by a simple automatic push button control.

The control of these motors is most ingenious. The operator simply closes an ordinary push button, which closes automatic contactors on low voltage taps of starting compensators, then by means of special relays throws in the direct current field when the motor has reached a predetermined speed, following this with another contactor which throws the machine across the line under full synchronous operation. A fourth automatic operation then occurs which closes the magnetic clutch and permits of the



A 500-hp. synchronous motor connected to a compeb mill through a Cutler-Hammer magnetic clutch in a cement plant. Magnetic clutches similar to this but smaller will be used on the roller mills of the New Cornelia Copper Company's concentrator mill which is now being completely electrified.

for reducing speed from 1,120 to 150 r.p.m. for driving the concentrator tables.

Taking everything into consideration, the installation in this mill warrants the study by both engineers and manufacturers of what can be done by electrical drive when full cooperation is secured between manufacturing company, consulting engineer, and the management of the industrial plant.

JOBBER, DEALER AND SALES AGENT



Selling the Cooperative Organization to the Trade

California Electrical Cooperative Campaign Presents Data Which Shows Value of Work Carried on in That State

Should a man approach the head of any business firm suggesting that the executive give him fifty dollars, the chances are that he would be turned down and he would be forced to leave without securing the money. However, if the applicant for the money approached the executive with a plan which showed conclusively that if the man furnished the visitor with ten thousand dollars, he could be reasonably sure of securing fifteen thousand dollars in return, the executive would at least listen to him. To secure money from a business man, it is necessary to offer him a proposition which presents to him some means of making more money.

Money will not be invested in any venture unless there is some definite arrangement whereby it will be returned to the investor at a profit. To secure funds to finance any proposition it is necessary for the promoter to have a great deal of information at hand so that he can give interested persons full details concerning the money-making possibilities of his scheme. If a scheme is speculative, there must be added chances of securing profit to make up to the investor for the lack of security that comes with the speculative venture.

Men of the business world have realized that cooperative organizations among members of their particular industry have in many cases been of great value to them, but have never really had figures accurately presented to them which could show what these cooperative bodies have done for the industry. Definite figures which show how much cooperative organizations have actually done for an industry are very few and it is seldom that these figures are presented to the contributors who keep the organizations alive.

The California Electrical Cooperative Campaign has realized this fact, and its advisory committee has recently had prepared a number of tables which show how the Campaign is benefiting every factor in the electrical industry, through its endeavors to increase the number of outlets in the homes in California. This cooperative organization has been operating for a period of five years and in that time it has been conducting educational campaigns designed to show the home owner how his home could be bettered through the installation of more outlets.

The theory upon which the Campaign advisory board has worked is that the electrical industry is really dependent

upon the number of electrical outlets in the average home. The benefit that will accrue to the electrical industry from the building of a new house, can be measured by the number of outlets provided for in the plans of the house, for every branch of the industry from the central station to the electrical contractor-dealer will be benefited if more outlets are provided.

The members of the California Electrical Cooperative Campaign know that the work of the organization has done a great deal to increase the number of outlets in the homes of California, and are firmly behind the advisory committee. Financial affairs have not worried the executive heads of the Campaign, but these men have thought it wise to prepare accurate data which would make it possible to show any person interested in the electrical business, just how much the part of the industry that he was in would be benefited by the addition of one outlet to the average home in California.

As a result, a careful survey was made of the electrical industry in the state and an analysis was made covering 270,839 lighting customers. A continuous record was also kept of the number of outlets installed per job covering 87,984 jobs over a period of thirty-five months. It was also determined that the average number of outlets installed per job, is now 14 and that should this average be raised to 15 per job, the total increased income to all branches of the industry in five years would be \$3,790,400.

One of the main reasons for having the tables made, was that it was found necessary to determine how each branch of the electrical industry would be advanced by the increasing of the number of outlets per job from 14 to 15. In this way a definite statement could be presented to the men of any branch of the industry, showing how much the work of the Campaign was aiding their particular branch of the business.

In addition, this method of determining who was benefited by the work of the Campaign also gave the finance committee a means of allotting the sums to be subscribed by the several branches of the industry. The factors that are benefited the most should undoubtedly help to defray the expenses of the Campaign, in the greatest amount.

In presenting the figures to the members of the Campaign, an effort was made to make the data as readily readable as possible. To secure greater

emphasis, on the distribution of the profits accruing to the four factors of the industry, the compilers of the data also made the figures into a graph, which accompanies this article. The same figures are used and the two circles show how the income is divided among the four groups and also the ratio of the income received by the various branches of the industry excluding the contractor-dealer. The bars below each circle also show how the income is prorated among the branches of the electrical business.

All of the tables reproduced here were sent to the members of the California Electrical Cooperative Campaign and each member also received a copy of the chart. In this way everyone was given the opportunity to know just what the Campaign was doing in an effort to aid the industry. The data was preceded by a letter which read as follows:

"After five years of successful achievement, the entire electrical industry of the state is thoroughly imbued with the aims and purposes of the California Electrical Cooperative Campaign and is in sympathetic accord with its constructive policy.

"From a commercial viewpoint the California Electrical Cooperative Campaign is a concentrated effort of the entire electrical industry to educate the public to a greater per capita use of electricity, leaving each component factor full latitude to initiate plans to tie in and benefit from this educational work.

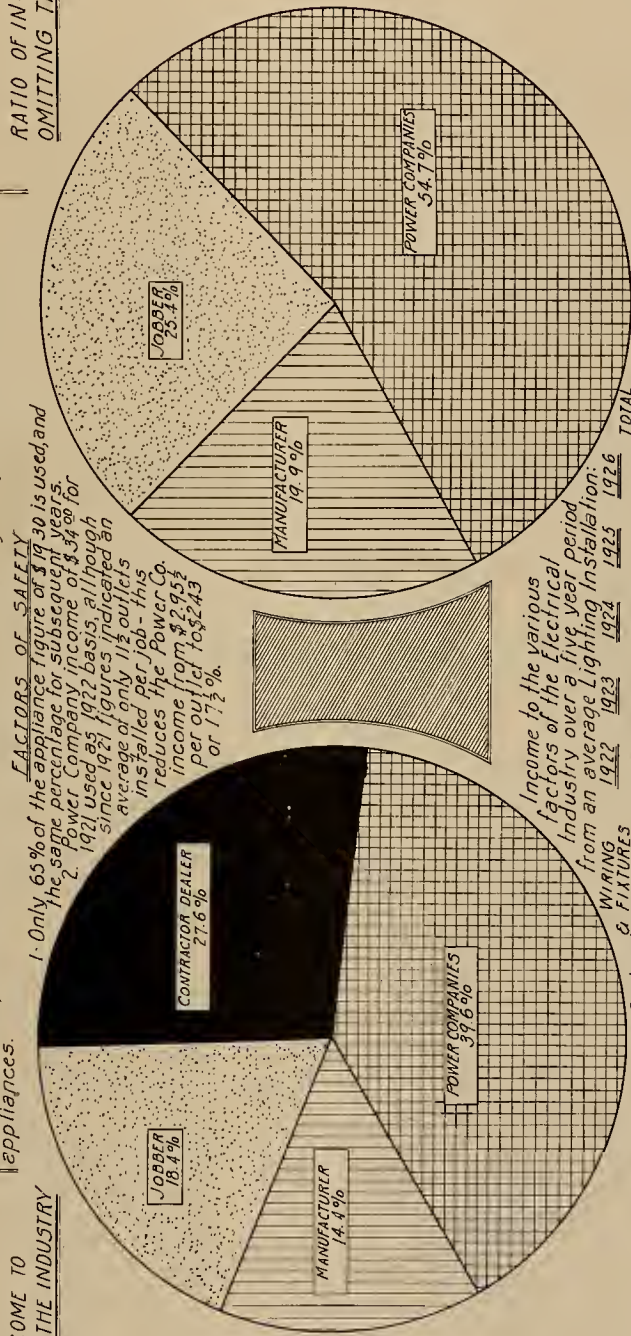
"The accomplishments of the Campaign have been clearly set forth each year in its annual report, together with reports to contributors issued monthly during the year. Copies of past reports are available and a copy of the 1922 report is being mailed under separate cover. In this connection we briefly submit plans for 1923.

"To continue on with the program of properly wired homes, both new and old, apartment houses, hotels, office buildings, commercial institutions and schools through the installation of the electric convenience outlet, together with adequate and proper illumination, laying particular stress on the necessity for adequate wiring to accommodate the heavier current consuming equipment used for water heating, electric cooking and air heating, to the extent to which the latter is deemed economically practical; to raise the standard of illumination in both stores and store windows to conform with modern established practice and to stimulate a marked increase in electrical installations and electrical merchandising; to continue to enlighten the electrical con-

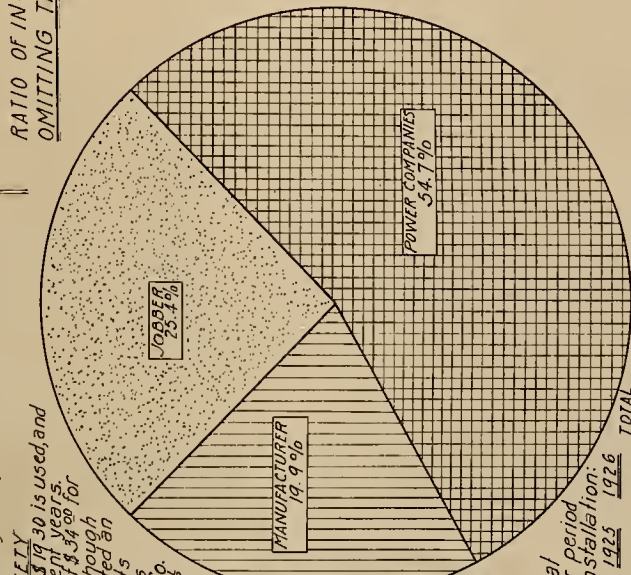
Ratio of Responsibility of the Various Factors of the Electrical Industry as established by their Relative Income.

The facts upon which the relative percentages have been developed are as follows:-
1. An Analysis of 37,104 lighting installations in California during 1922 established an average of 14 outlets per job.
2. An Analysis of Power Company income from 270,839 Lighting Customers indicates an average annual income per customer of \$34.00
3. The figures of 25 representative power companies indicate an average retail cost of \$77.00 for wiring and fixtures installed on lighting jobs in 1922 and an average expenditure of \$19.30 by new residential lighting customers for appliances.

DISTRIBUTION OF INCOME TO VARIOUS FACTORS OF THE INDUSTRY

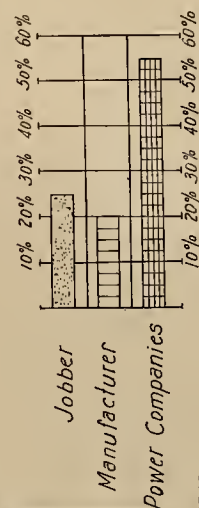
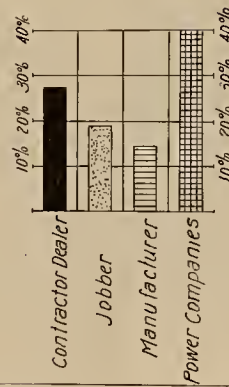


RATIO OF INCOME TO THE INDUSTRY OMITTING THE CONTRACTOR DEALER



Income to the various factors of the Electrical Industry over a five year period from an average Lighting Installation:

| | 1922 | 1923 | 1924 | 1925 | 1926 | TOTAL |
|---|-----------|-------|-------|-------|-------|----------|
| WIRING & FIXTURES | \$ 77.00 | | | | | \$ 77.00 |
| Contractor Dealer | 51.35 | | | | | 51.35 |
| Jobber | 41.08 | | | | | 41.08 |
| Power Companies | 34.00 | 34.00 | 34.00 | 34.00 | 34.00 | 170.00 |
| APPLIANCES | | | | | | |
| Contractor Dealer | 12.54 | 7.06 | 7.49 | 6.84 | 6.76 | 41.49 |
| Jobber | 8.36 | 5.24 | 4.99 | 4.56 | 4.51 | 27.66 |
| Power Companies | 6.27 | 3.43 | 3.74 | 3.42 | 3.38 | 20.74 |
| Power Companies (included in table above) | | | | | | |
| Contractor Dealer | \$ 118.49 | | | | | |
| Jobber | 61.82 | | | | | |
| Power Companies | 170.00 | | | | | |
| Pro rata of income | 21.6% | | | | | |
| Income per outlet | | | | | | |
| Contractor Dealer | \$ 5.50 | | | | | |
| Jobber | 3.67 | | | | | |
| Power Companies | 2.93 | | | | | |
| Income per outlet | | | | | | |
| Contractor Dealer | \$ 8.46 | | | | | |
| Jobber | 1.97 | | | | | |
| Power Companies | 1.48 | | | | | |
| Income per outlet | | | | | | |
| Contractor Dealer | \$ 20.60 | | | | | |
| Jobber | 12.14 | | | | | |
| Power Companies | 12.14 | | | | | |



RETAIL VALUE OF ONE OUTLET TO THE INDUSTRY \$20.60
An estimated total of 184,000 jobs was installed in California in 1922.
One additional outlet installed on each of these jobs represents in five years an added income to the industry as follows:-
Manufacturers, Jobbers, Contractor Dealers \$1,556,640.00
Power Companies 2,233,760.00
\$3,790,400.00

tractor and electrical dealer on such matters as proper estimating and methods of merchandising together with the fundamentals of economics and finance applied to their business. To carry out these plans involves the promotion of ten electric homes, five illuminated billboards and other special undertakings along educational lines all widely distributed over the state; the enlarging of the Campaign staff by six additional field representatives, two of whom will be women lecturer-demonstrators.

"The unprecedented business possibilities during the months ahead places a demand upon the Campaign for a greatly enlarged program during the present year in order that it may be more helpful in developing a higher state of proficiency within the industry and that its appeal to the public may have a more far-reaching effect.

"In order to place before the constituent branches of the electrical industry, on a unit basis, the value of the Campaign's activities we have selected for the purpose of analysis one phase only, i.e., the electrical convenience outlet. The result of that analysis is presented by a chart, together with accompanying tabulation compiled by Evans and Barnhill, Incorporated.

"Entirely apart from the direct value to the industry of proper wiring and the convenience outlet is the increasing requirements for construction material, generating and distribution equipment pertinent to greater per capita consumption of electricity. It therefore follows that every concern engaged in the electrical business, regardless of its position in the industry, receives a direct benefit from this constructive work.

"It is conservatively estimated that the enlarged program will require a budget of \$50,000 for the current year and for the next annual period approximately \$65,000. Facing this responsibility it is the unanimous opinion of the Campaign's advisory committee that the budget be apportioned as follows: \$30,000 to be underwritten by the power companies and \$20,000 by the electrical manufacturers, jobbers and contractors. It is intended that subscriptions from retailers are to be credited to the power companies' allotment.

"Enclosed is a contribution blank indicating the amount which in the judgment of the advisory committee is your equitable proportion of the Campaign budget for the current year.

"We earnestly request your prompt and favorable attention.

"Yours very truly,

"R. E. FISHER,

"Chairman, Advisory Committee."

The accompanying tables prepared for the Campaign show how the four factors in the industry are affected by the number of outlets installed in the average home. The results which are here tabulated were all secured with reference to California only, but they are of interest to other states, even though they need modification.

In Table I the figures represent what the four branches of the industry receive from the average house with 14 outlets. The results are carried out over a period of five years to show how the industry will be affected at that time. The original installation of wiring and fixtures does not change and

APPORTIONMENT OF THE VALUE OF ONE OUTLET TO THE VARIOUS FACTORS OF THE ELECTRICAL INDUSTRY. ALSO PROPORTION OF ANNUAL INCOME TO EACH FACTOR FROM THE INSTALLATION OF ONE ADDITIONAL OUTLET ON EACH JOB INSTALLED IN CALIFORNIA

NOTE: The Power Company income is computed upon the analysis of 270,839 lighting customers, and the continuous record of the number of outlets installed per job covering 87,934 jobs in a period of thirty-five months. The income from appliances installed both for a new installation and the purchases for each year thereafter is computed from the records of twenty-five representative power companies throughout the United States. From the average records obtained from the data indicated above, final computation is based upon 184,000 jobs. Final allowance has been made in all figures for the established ratio—that approximately thirty-five per cent of all installations are industrial and commercial jobs, and, therefore, not subject to the computation of the analysis of appliance purchases. All calculations have been carried forward to cover a period of five years, which gives a competent average of increment to the factors involved.

| TABLE I | | 1922 | 1923 | 1924 | 1925 | 1926 | Total |
|-----------------------------|--|---------|---------|---------|---------|---------|---------|
| Wiring and Fixtures—Per Job | | | | | | | |
| Contractor-Dealer..... | | \$77.00 | ..... | ..... | ..... | ..... | \$77.00 |
| Jobber..... | | 51.35 | ..... | ..... | ..... | ..... | 51.35 |
| Manufacturer..... | | 41.08 | ..... | ..... | ..... | ..... | 41.08 |
| Power Companies..... | | 34.00 | \$34.00 | \$34.00 | \$34.00 | \$34.00 | 170.00 |

| TABLE II | | 1922 | 1923 | 1924 | 1925 | 1926 | Total |
|-------------------------|--|---------|--------|--------|--------|--------|---------|
| Appliances—Per Job | | | | | | | |
| Contractor-Dealer..... | | \$12.54 | \$7.86 | \$7.49 | \$6.84 | \$6.76 | \$41.49 |
| Jobber (33 1/3%)..... | | 8.36 | 5.24 | 4.99 | 4.56 | 4.51 | 27.66 |
| Manufacturer (50%)..... | | 6.27 | 3.93 | 3.74 | 3.42 | 3.38 | 20.74 |

| TABLE III | | Income per Job | Income per Outlet | Per Cent of Contribution | Pro Rata to All Factors ex C-D | Per Cent of Cont. ex C-D |
|---|--|----------------|-------------------|--------------------------|--------------------------------|--------------------------|
| Combined Income over Five-Year Period | | | | | | |
| Contractor-Dealer..... | | \$118.49 | \$8.46 | 27.6 | | |
| Jobber..... | | 79.01 | 5.64 | 18.4 | \$7.79 | 25.4 |
| Manufacturer..... | | 61.82 | 4.42 | 14.4 | 6.10 | 19.9 |
| Power Company..... | | 170.00 | 12.14 | 39.6 | 16.77 | 54.7 |
| Value of 1 outlet to industry in 5 years..... | | | 20.60 | 99.9 | | 100.0 |

On the basis of an average of fourteen outlets installed per job in 1922, the unit value of an outlet over a five-year period to the various factors of the industry is as follows:

| TABLE IV | | Wiring and Fixtures | Appliances | Total |
|------------------------|--|---------------------|------------|--------|
| Contractor-Dealer..... | | \$5.50 | \$2.96 | \$8.46 |
| Jobber..... | | 3.67 | 1.97 | 5.64 |
| Manufacturer..... | | 2.93 | 1.48 | 4.41 |
| Power Companies..... | | | | 12.14 |

Then $\$8.46 + \$12.14 = \$20.60 \times 184,000 = \$3,790,000$ —Minimum value of 1 additional outlet per job in California over a five-year period.

On the basis of an average of fifteen outlets per job, the income to the various factors of the Electrical Industry as given in Tables I, II and III will be increased by the amounts indicated in Table IV, as follows:

| TABLE V | | Wiring and Fixtures | Appliances | Total |
|------------------------|--|---------------------|------------|---------|
| Contractor-Dealer..... | | \$13.42 | \$8.03 | \$21.45 |
| Jobber..... | | 8.95 | 5.35 | 14.30 |
| Manufacturer..... | | 6.71 | 4.01 | 10.72 |
| Power Companies..... | | | | 182.15 |

Therefore, in a five-year period the difference between an average of fourteen outlets and fifteen outlets per job in California will represent the following differences in dollar income per job to the various factors noted.

| | | 14 Outlets | 15 Outlets | Total increased income to |
|------------------------|--|------------|------------|---------------------------|
| Contractor-Dealer..... | | \$118.49 | \$126.95 | Manufacturers |
| Jobber..... | | 79.01 | 84.66 | Jobbers |
| Manufacturers..... | | 61.82 | 66.15 | Contractor-Dealers |
| Power Companies..... | | 170.00 | 182.15 | Power Companies |
| Gain, 7% | | | | \$1,556,640 |
| | | | | 2,233,760 |
| | | | | \$3,790,400 |

The above tabulations are based upon the most accurate data obtainable, and are believed to reflect actual conditions to a dependable degree.

Compiled by Evans & Barnhill, Inc., San Francisco

in this table it is only the power company which receives revenue for the full five-year period.

In Table II, the retail price of appliances sold, averaged per home, is figured for five years, and may be found in the top line. Thus the contractor-dealer receives an average of \$41.49 per house for appliances in a period of five years and the jobber and manufacturer receive respectively \$27.66 and \$20.74 in the same time. The diminishing amounts are used because a decline in appliance prices is counted upon and in this way the estimate is made more conservative.

By combining Tables I and II, in the first column of Table III it can be seen that the total income of the contractor-dealer per job, in five years is \$118.49; that of the jobber is \$79.01; that of the manufacturer is \$61.82; and that of the power company totals \$170. In the second column the income has been reduced to "Income per Outlet," figures which were secured by dividing the total income by 14, the number of outlets in the average job. The total value of one outlet in five years thus is the retail value of the appliances, wiring, fixtures, etc., and the value of service supplied by the power company, or \$20.60. In the third column is shown the percentage of the business which accrues to each branch of the industry. This also gives a theoretical basis for

apportioning the expense of the league among the branches of the industry. However, the advisory committee of Campaign has decided that the contractor-dealers are not in a position to carry over one-quarter of the expenses and the committee has relieved this branch of the trade from sharing in the expenses, except as they may feel able. In the next column the total of the second column is divided in a new way, excluding the contractor-dealer, and in the fifth column, the percentage of contributions is again figured, but based on the figures in column four. These last figures show what percentage of the expenses of the cooperative organization's work each of the three factors should carry.

Tables IV and V show how the addition of one outlet to each job would affect the four factors in the industry, giving first what the increase would be and, then, the income to the particular class of the industry. The five-year income, with 15 outlets installed, is also compared with the income where 14 outlets are placed. The total increase is then figured by multiplying the value of the additional outlet, determined to be \$20.60, by 184,000, the number of jobs upon which one more outlet could be installed, and the result is found to be \$3,790,400. This sum is calculated for a five-year period and is the combined gain of the four factors.

Electrical Advertising Field
Shown in Recent Survey

The rate of increase in the use of electrical advertising through more and larger displays and the substitution of higher wattage lamps in already existing sockets was, previous to the last year, about 15 per cent annually. A much faster growth has evidenced itself during 1922. This has been due to two major influences. Publicity managers are appreciating more fully the many advantages and the comparative efficiency of this medium and are appropriating a constantly growing part of their advertising budget to it; and central station commercial managers are realizing more generally the desirable and profitable nature of the electrical advertising load and are joining in organized stimulation of the field.

The opportunity for promoting electrical advertising is brought out, reports the Society for Electrical Development, by surveys conducted in the spring of

- sizes. In large cities and small cities organized sales effort has succeeded equally well in promoting a high per capita use of electrical advertising, and it is also true that lack of stimulation has everywhere resulted in a lower use of this medium.
2. The opportunity exists in all sections of the country. Again, it is found that north, east, south and west respond enthusiastically wherever organized effort is made.
 3. In industrial and commercial cities, trading centers or agricultural districts, summer and winter resorts, in cities of all types this medium is effective and has been used extensively whenever vigorously offered.
 4. The actual development in specific cities of all sizes, types and districts, however, does vary enormously depending upon the promotional effort put forth. The average development is equivalent to 3-1/3 watts per inhabitant, corresponding to about 5 kw-hr. annually. Some cities report only 1/10 watt per inhabitant while

HOW HIGH IS YOUR STACK?
By JOE OSIER

A glimpse of a stack of trade journals piled high on the desk of an executive official of a going concern—many of them with the wrappers still on—

(The journals, not the officials)—
Always prompts me to rise on my hind legs and inquire—

“What in the name of a name and eight hands ’round, do you take trade publications for, anyway? If you want them for dust catchers—why don’t you substitute a fish net—hang it on the wall and fill it full of—

“Wish you were here’ cards?”
And, you know, invariably, those Birds chirp back at me with this weak sister warble—

“Haven’t had time. Too busy.”
That is one fine excuse. It is almost as good as that ol’ wheeze—

“I forgot,” or—
“I was drunk when I did it, Judge.”

Now, practically every man I know who earns his cakes in the electrical industry, has time to buzz base ball, go to the fights—take in the movies or jazz a few, fast rounds at some maple cuffling party—

Still, when it comes to taking time out to read editorials, articles or news stories about the business in which they are engaged—

Some of these men (they are few, Allah be praised)—

Stick the crutches under the arm of Ol’ George Too Busy and send him out to do battle.

It occurs to me, seeing that we observe—“Eat an Apple Week”—“Take a Bath Week”—Music Week and Get Acquainted with your Wife Week—

We should set aside a period of time during which the men of all trades could lock their doors, throw the keys down the elevator shaft and—

Celebrate “Read your Trade Journal Week.”

All over this country—the Home of Democracy—the income tax—and conferences ranging from limitation of armanents to confabs on home brew—

Reporters are poking inquisitive noses into other people’s business, trying to glean bits of information which may be of interest to you and to other men in the game.

Editors of trade publications are sweating and grunting in an attempt to hurl something in your direction which will be of assistance in gathering unto yourself—

The sheaves.
And, despite this fact, some of you stack the results of these men’s labors on the tops of your desks and say—
“Manana — Tomorrow.”

“Tomorrow,” you say, “health and strength permitting, I’ll read ’em from frontispiece to index.”

Take the case of this column, for instance. How do I know that these lines, which I have brought forth in travail—

And straining of the head muscles—

May not soon be resting peacefully on the top of a pile of magazines as tall as Popocatepetl?

I don’t. So I’ll end the argument right here.

The 250,000 electrical displays in the United States consist off:

| | |
|--|---------|
| Exposed lamp signs..... | 112,000 |
| Enclosed Lamp signs..... | 81,000 |
| Bulletin and poster boards..... | 60,000 |
| Building outline and marquee lighting..... | 7,000 |
| Total, 250,000 | |

The 15,000,000 sockets have the following lamps:

| Lamp Size | Per cent of total lamps | No. of lamps | Connected kw. | Per cent of total wattage | Notes |
|-----------|-------------------------|--------------|---------------|---------------------------|--------------------|
| 5 watts | 39.2 | 5,860,000 | 29,300 | 14.8 | Decreasing rapidly |
| 10 | 43.8 | 6,680,000 | 66,800 | 33.2 | |
| 15 | 3.0 | 448,000 | 6,700 | 3.4 | Increasing rapidly |
| 25 | 7.4 | 1,108,000 | 27,600 | 14.0 | Increasing rapidly |
| 40 | 0.5 | 81,000 | 3,240 | 1.6 | |
| 50 | 3.2 | 471,000 | 23,500 | 11.9 | Increasing rapidly |
| 60 | 0.3 | 38,000 | 2,280 | 1.1 | |
| 75 | 0.6 | 89,000 | 6,700 | 3.4 | |
| 100 | 1.5 | 160,000 | 16,000 | 8.0 | |
| 150 | 0.2 | 34,000 | 5,100 | 2.6 | |
| 200 | 0.3 | 52,000 | 10,400 | 5.2 | |
| 250 | .2 | 24,000 | 1,200 | 3.0 | |
| Total, | 15,005,000 | | 198,820 | | |

Average, 13.2 per cent.

| | | |
|---|-----------------|----------------|
| The largest display has a connected load of | 300 kw. and has | 20,000 sockets |
| The average display | 800 watts | 60 sockets |
| The smallest display | 25 watts | 1 socket |

Chief users of electrical advertising in the country as measured in number of sockets connected:

| | No. of Lamps |
|---|--------------|
| 1. Theaters (motion picture and legitimate)..... | 2,680,000 |
| 2. Automotive (sales offices, garages, oil stations)..... | 1,500,000 |
| 3. Restaurants (cafes, lunch rooms, etc.)..... | 1,290,000 |
| 4. Clothing (stores, tailors, cleaners, etc.)..... | 1,280,000 |
| 5. Hotels (rooming houses, etc.)..... | 1,260,000 |
| 6. Banks (investment houses, etc.)..... | 780,000 |
| 7. Drugs | 700,000 |
| 8. Shoes (stores, repair, etc.)..... | 385,000 |
| All others | 5,000,000 |

1922 through the cooperation chiefly of the Lighting Sales Bureau of the National Electric Light Association and the monthly journal, Signs of the Times. One hundred and twelve central stations assisted by furnishing detailed information from their cities and sign manufacturers from thirty other cities did likewise. These surveys reveal the facts regarding electrical advertising development in 143 cities in the United States with an aggregate population of 6,300,000. In addition to showing the relative popularity of different forms of displays, the distribution of the load by lamp sizes, and the demand by various classes of consumers, these surveys bring out the following fundamental facts:

1. The opportunity for development is relatively the same in cities of all

others show 10 watts per inhabitant, or more. If the development of all cities is brought up to that already obtaining in the best ten per cent, the central station revenue from electrical advertising will be increased from its present figure of \$15,000,000 annually to \$35,000,000.

A restaurant in Rossland, B. C., in the country of the famous winter carnivals, has installed individual electric toasters at the lunch counter and booths. Patrons toast their own bread and can satisfy their individual tastes as to the crispness desired. This feature is keenly appreciated, particularly in the evening during coasting season when guests come in for warmth and refreshment after hours spent on the six-mile slide.



The display is given a touch of the dramatic by the use of a sliding curtain. When the proper lighting effect is attained, the lecturer draws aside the curtain, thereby emphasizing the change which has been effected by the mere turn of a switch.

Offering the Merchant Better Window Lighting

California Electrical Cooperative Campaign Devises Portable Show Window to Demonstrate Proper Illumination Intensity

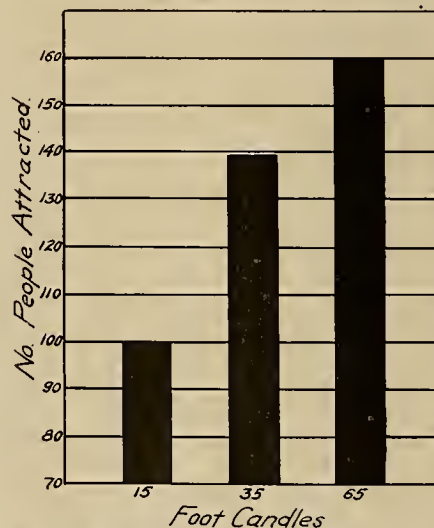
It has been estimated that something like 47 per cent of the incandescent lamps manufactured in 1922 were used for store and other forms of commercial lighting. Similarly, approximately 10 per cent of the central station load, representing 25 per cent of the gross revenue, consisted of commercial lighting. No attempt has been made to estimate the value of the wire, fixtures and appliances used annually in this field of illumination. Not the least important subdivision of this field is show window lighting and it is in this direction that the educational efforts of the electrical industry are being turned at the present time. The purpose is twofold, first, to increase the standard of show window lighting, and second, to increase the use of electricity for this purpose, at the same time increasing the sale of the materials necessary for utilizing the power most effectively.

The California Electrical Cooperative Campaign has recently undertaken the task of selling good show window lighting to the merchants of that state. A portable window display that embodies all of the latest developments of show window illumination and, at the same time, enables the operator to effectively demonstrate poor lighting, has been constructed and will be shown before a series of industry meetings in every important city in the state.

The window has been constructed in the same manner as a stage setting. It may be knocked down, crated and shipped from place to place with no difficulty, yet when it is assembled it presents a highly attractive appearance, as is indicated in the accompanying photographs.

The latest show window lighting equipment has been installed in the window. Three different kinds of fix-

tures are used and two spotlights have been installed for increasing the intensity of light on the most important element of the display. Daylight Mazda lamps are used for lighting the window. Red, green and blue color screens are also a part of the equipment. By attaching an ordinary dimmer to the lighting circuit, three intensities may be obtained. The first is to show poor

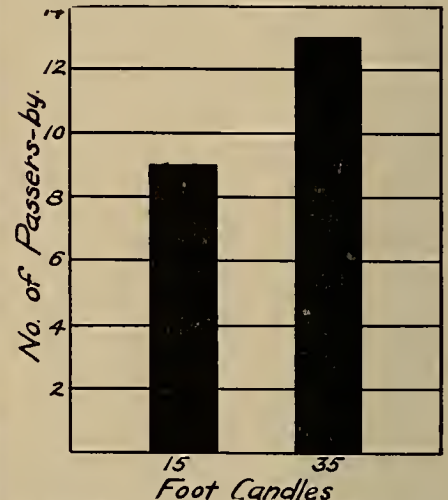


With an intensity of 25 foot candles it was found that by using color screens with no change the wattage, 46 per cent more passers-by stopped to examine the display.

lighting while the maximum indicates the intensity which is to be desired.

In the larger cities the portable window will first be displayed at meetings of the electrical organizations to which outstanding merchants have been invited as honor guests. This has already been done in Oakland and Los Angeles

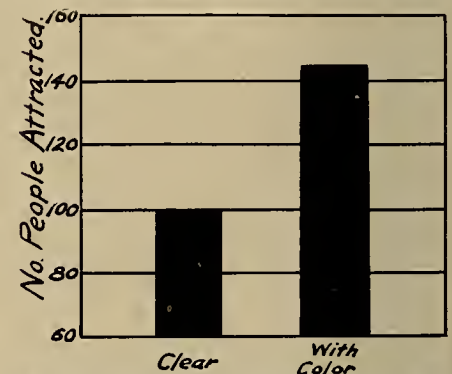
with the cooperation of the Electric Clubs in those two cities. A similar meeting will be held in San Diego under the auspices of the San Diego Electric Club and the display will then be brought to San Francisco for use be-



The number of passers-by who stopped to look at a window increased 39 per cent when the intensity was increased from 15 to 35 foot candles, while 60 per cent more stopped when the intensity was increased to 65 foot candles.

fore the Electrical Development League of that city. The window received its premier display before the furniture dealers of the state, gathered in San Francisco for the annual furniture week. It was set up in the Palace Hotel, the headquarters for furniture dealers from all parts of the state, and attracted considerable attention and comment.

The important feature of the meetings is the lecture which is given by an illuminating engineer furnished by one



With an intensity of 15 foot candles, 9 per cent of the passers-by stopped, whereas with an intensity of 35 foot candles, 13.4 per cent were attracted.

of the lamp companies. It is he who puts into words the story of better merchandising which the window visualizes.

Under the heading, "Sales Increase with Lights," the results of a series of tests conducted by lighting service engineers, which show the ratio of intensity of show window illumination to the number of persons attracted, are presented as follows:

| Illumination (in foot candles) | Total cost of electricity per hour | Number of persons stopped out or each hundred |
|--------------------------------|------------------------------------|---|
| 15 | 6c. | 10 |
| 30 | 9c. | 12 |
| 50 | 13c. | 15 |
| 65 | 17c. | 17 |
| 85 | 19½c. | 19 |
| 100 | 22c. | 21 |



These two views of the portable window display prepared by the California Electrical Cooperative Campaign for the purpose of selling better window illumination to the merchants of the state give some idea of the attractiveness of the exhibit. The display in this case features furniture. The lower picture shows the operating mechanism for the lights and one of the charts used in the lecture on better lighting, which is given by an illuminating engineer.



INDUSTRIAL NEWS



Preliminary Permits Are Issued by Federal Commission

Among the preliminary permits recently issued by the Federal Power Commission at Washington, D. C., two are for western projects. Frank I. Reed of Anchorage, Alaska, has been granted a preliminary permit which gives him two years to make the necessary investigations and final plans for a proposed project on Eklutna River on public lands partly within the Chugach National Forest, Alaska. A preliminary permit for one year has also been granted to the Mokelumne River Power & Water Company for a power project on the Middle and South Forks of the Mokelumne River, North Fork of the Calaveras River and Esperanza Creek, in Calaveras County, California. Two storage reservoirs and three power houses are contemplated in this project. Application has been made of the commission for a preliminary permit to develop a power project near Hyder, in southwestern Alaska, which proposes a diversion dam and a power house capable of developing 10,000 hp. The purpose of Ernest Blue and Noel Traversy, the petitioners, is to furnish power to Hyder and Stewart, B. C.

The commission has canceled the preliminary permit issued to R. G. McDonald involving proposed developments on Convict Creek in Mono County, California, because of Mr. McDonald's failure to provide adequately for stream gaging work.

Cooperation with Architects Is Suggested by Field Man

The visit to Denver of K. A. McIntyre, representative of the Society for Electrical Development, proved of unusual interest according to reports received from the Electrical Cooperative League of that city. Although his visit covered only two days, several meetings were held and special work was done with the leading architects and builders looking towards the development of closer liaison between those interests and the electrical industry through the work of the league's field representative.

The charts recently prepared by Mr. McIntyre to express in a more graphical way his message, that of putting cooperation to work, held the center of attention during the talk he gave on the night of Feb. 12. The weekly meeting of the league advisory board was changed to that date in order that Mr. McIntyre could closely observe the operations of the governing body of the organization. The explanation made that evening on the difference between group development and cooperative effort,

proved so interesting, it is said, that the talk was repeated the next evening before the Denver Association of Electrical Contractors and Dealers.

Through the league, the assistance of several leading architects in Denver was secured in advising on the booklet of useful information being prepared by the society for architects, builders, and others needing education along electrical lines.

Montana Utilities May Be Taxed 2 Per Cent on Receipts

Power companies generating or transmitting electric power in the state of Montana will be taxed two per cent of their gross receipts if a bill presented to the state legislature is passed. The bill for the additional tax upon power companies, provides that each company in addition to the reports otherwise required, must submit, at such times and in such manner as may be stipulated, reports and information that may aid the state utility commission in arriving at the true gross receipts.

The bill would make the tax for 1923 payable upon receipts for 1922 and requires that the report be made by April 1. Subsequent reports would be due on March 1 of each year. Revenue to be derived from the tax would be placed in the general fund of the state.

Utah Mining Company to Double Capacity of Lead Mill

The Utah-Apex Mining Company, of Bingham, Utah, an extensive user of electric power in its operations, has arranged to double its milling capacity, of 400 tons of ore daily. The necessary machinery has arrived, and the new unit will be in operation at an early date. It is stated that one more unit is to be installed in the near future, and that the total capacity of the mill will be 1,000 tons of ore daily.

The company is using a new flotation process, by which it is now able to save a maximum of values and is in a position to treat large bodies of low grade ore that heretofore were not profitable. The Utah-Apex is one of the foremost lead producing mines in the world.

The citizens of Goshen, Utah, who for some time have been operating a small power plant, have closed a contract with the Utah Power & Light Company to take care of their electric light and power requirements. The new arrangement will mean continuous day and night service, to replace the former service which consisted of night service only, with two afternoons a week when electrical appliances could be operated.

Parts of National Code Adopted by Oregon Commission

By an order recently passed by the Public Service Commission of Oregon, the rules of the commission governing overhead and underground electrical construction have been annulled, and the rules covering these subjects made by the Bureau of Standards of the Department of Commerce have been declared to be in effect in Oregon. The commission decided that the sections of the National Electrical Safety Code relating to these types of construction were suitable for the state and desired to have the regulations in Oregon conform to the national practice.

The commission also provided that any subsequent alterations or modifications which should be adopted by the Bureau of Standards should automatically come into effect in Oregon. The new rules will affect new construction and reconstruction alike. The commission reserved the right to require a change in any installation which it might deem hazardous.

San Francisco Supervisors Halt Wire Appropriations

The members of the board of supervisors of the city of San Francisco have come to the decision that before any money is authorized for the purchase of transmission line equipment, some definite method of disposing of the power generated at its Hetch-Hetchy plant must be arranged. Contracts for transmission cable have already been awarded by the engineers in charge of the line, but the board of supervisors will not appropriate the sum at this time.

The board members think it foolish to construct a transmission line from the Moccasin Creek power house to the east side of San Francisco Bay when no definite plans for disposing of the power have been made. It is the wish of the board that the city retail the power itself and not wholesale it to any of the California power companies.

No further action has been taken on the question.

The Washington Water Power Company of Spokane, Wash., has recently announced plans for the erection of a transmission line from Moses Lake to Quincy, Grant County, Washington. The power which will be carried over the new line will be used by farmers in irrigating the orchards that are around Quincy. The line will be for 13,000-volt operation and will be 20 miles long. Quincy is on the northern edge of the Columbia River Basin Irrigation project.

British Columbia Company Starts Development

New Demands for Power Make It Necessary for Company to Increase Generating Capacity of Stave Lake Units

Increasing demands for power upon the British Columbia Electric Railway Company of Vancouver, B. C., has necessitated extensive developments to care for the anticipated load. The largest new purchaser of power is the Britannia Mining & Smelting Company, of Britannia Beach, B. C.

Prior to this time the Britannia Mining & Smelting Company has developed its own power, using two hydroelectric plants of 1,950 and 8,490 hp. capacity and two steam plants with capacities of 500 and 2,000 kva. A small creek some seven miles in length has been the source of water supply, but fluctuations in the amount of water available has made the power from the hydro-

tanna is built. Construction will start shortly on a distribution system there, some twenty miles in length, to carry street lighting and single and three-phase light and power service. Approximately 600 new homes will have electricity for light and power available for the first time.

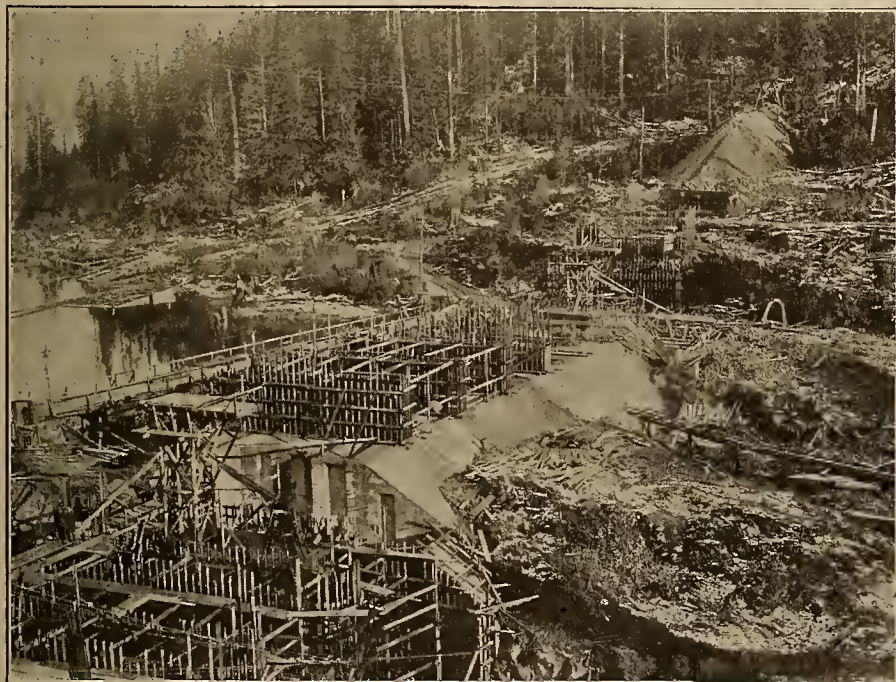
To safeguard the interests of all its consumers, the company is building a high tension line by an all-land route from its Lake Buntzen plant to Barnet, instead of crossing the south arm of Burrard Inlet by a 2,845-ft. span at Barnet. In addition the present line from Port Moody to Barnet will be reconstructed, making an entire new circuit from Lake Buntzen to Barnet.

dam will be 600 ft. long, including approaches 60 ft. wide.

A unique feature of this construction work is the operation of the narrow gage construction road on the job itself



Hydraulicking the debris from the site of the Blind Slough dam with water pumped by electrically driven centrifugal pump located on a barge moored on the surface of Stave Lake.



Sluice dam at Blind Slough, Stave Lake, B. C., under construction by the British Columbia Electric Railway Company, Vancouver.

electric plants variable and incapable of further development.

To care for the increasing amount of power needed, the Britannia Mining & Smelting Company has signed a long time contract for approximately 5,000 hp. from the British Columbia Electric Railway Company. This energy will be transmitted at 34,600 volts, using a new transmission line to be constructed immediately.

This transmission line will be some thirty miles in length, will cost approximately \$175,000 and will follow the line of the Pacific Great Eastern Railway from North Vancouver to Whytcliffe, and thence up the coast to Britannia Beach.

The mining company will construct its own substation and will handle its own distribution. This will enable them to shut down the steam plants and use the hydroelectric plants to care for additional load and to correct the power factor.

West Vancouver will receive electric light and power service for the first time when the high tension line to Bri-

At present the central station is further developing its Stave Falls plant. Recently a fourth unit was installed there, bringing the capacity of that plant up to 35,300 kva., and there is still available in the Stave River, within three miles of the present site, water for the development of 100,000 hp.

Work is now progressing at Stave Falls on raising the main dam 25 ft. in height. This necessitates also the installation of new roller gates in the present dam in place of the Taintor gates now in use—the chambers in which the old Taintor gates operated will be filled with concrete to give the dam additional weight.

Stave Lake at present is approximately 18 miles long and has an area of 13 sq. miles. The increased height of the dam, while making necessary the construction of another sluice dam at Blind Slough, will provide storage for nearly 370,000 acre-feet of water.

Construction on the sluice dam at Blind Slough has been progressing for some months and will be completed this year. When completed this sluice

by electric power from the existing plant. Rock crushers, drills, air compressors and other equipment are operated by power supplied by the present plant at Stave Falls.

When the main dam is raised and the sluice dam completed a steel highway bridge will be built across the lake at the site of the main dam and the highway will cross the sluice dam at Blind Slough. It is likely, by the time this work is completed, that work will start farther down the Stave River on a new plant to utilize the water again after it has passed through the present plant at Stave Falls.

Transmission Line Lease Signed by Modesto and Turlock

The Modesto (Calif.) Irrigation District board of directors have abandoned attempts to purchase a one-third interest in the Turlock Irrigation District's transmission system and have made a proposal to the directors of the latter district that the Turlock district lease the lines. The proposal was accepted by the directors of the Modesto district on the agreement that the Turlock district pay \$8,000 a year for use of the lines and 1-mill-per-kw-hr. for step-down service at the Turlock substation.

The contract entered into by the two districts is to run for a period of five years and gives the districts renewal privileges. The contract also provides that "neither district shall sell nor in anywise dispose of electrical power within the district boundaries of the other, except that if either district should hereafter decide to wholesale its entire power then the district not wholesaling may distribute power in the district so wholesaling."

The power house at Don Pedro, owned jointly by the two districts, will be ready for operation during the month according to engineers on the job. The Turlock district is practically ready to handle the power and distribute it in competition with power companies as it has secured the permission of the city of Turlock to enter with its power lines.

An order for the electric material to be used in electrifying the planing mill of the Silver Mill Company, of Raymond, Wash., was recently awarded to the General Electric Company. In addition to a 750-kw. 480-volt turbo-generator and switchboard, the contract included approximately 800 hp. of motors.

Electric Railroad to Be Built in Montana Territory

Construction of an electric railroad from Columbus, Mont., to a point near Cooke City, Mont., will be started as soon as weather conditions permit according to an announcement made by the General Service & Engineering Corporation of Columbus. This company is to erect the railroad and an affiliated concern will provide electric power for the operation of the road.

The new railway will tap the irrigated agricultural district, the large coal fields at Nye, Mont., the mineral deposits tributary and on the Stillwater River and the timber district in the Beartooth National Forest. The district to be served by the new line has been in the need of transportation facilities for some time and will undoubtedly expand under the effect of the railroad.

Surveys have been made which show that approximately 15,000 hp. can be developed economically by the installation of hydroelectric equipment. This power will be used by the railroad and by mining companies in the vicinity.

Bill Which Would Abolish Utah Commission Is Rejected

The Senate committee on public affairs, of the Utah state legislature, recently returned the bill which would abolish the Public Utilities Commission of the state, with a recommendation that the bill be dropped. The bill is quite similar to one which was recently defeated in the house.

Two other bills which would curtail the power of the commission over municipalities and automobile corporations have been held by the committee for further consideration. These bills also provide a method whereby the public may be adequately represented at hearings of the commission.

New Line Will Serve Sawmills in Chiloquin District

To enable The California Oregon Power Company to serve a large sawmill load which it has not reached before, the company will build a 22-mile transmission line from Algoma, Ore., to Chiloquin, Ore. The line will be for 60,000-volt operation.

The company has been planning to enter this field for some time as about 1,500 hp. can be connected to the lines immediately. Light and power will be furnished the mills of the Chiloquin district, which is near Klamath Falls, Ore. Work on the line will be started as soon as weather conditions permit. It is estimated that the line will cost about \$60,000.

Electrical Society Will Issue Two New Pamphlets

The Society for Electrical Development will issue in March its Fourth Edition of "Customers Vs. Population" (U.S.A.) containing the latest available figures, showing the number of wired and unwired homes in the various communities reporting.

This latest edition is the most complete yet issued, and in addition to a revision of material which has appeared in previous issues, contains several new features of particular interest to all branches of the industry. As a guide to localities offering opportunities for

electrical business, this study enjoys a well earned reputation.

The first monograph of the very extensive publication program for 1923, upon which the society is engaged, in cooperation with the Joint Committee for Business Development, will be off the press about the middle of March.

This monograph, entitled "Business Residence Lighting Business" gives plans for a complete residence lighting campaign including suggestions for form letters, a bibliography of lighting booklets, etc., etc. A consumer booklet, and material for newspaper articles on residence lighting will be included with the monograph. It treats of the subject of residence lighting both from the individual and cooperative viewpoints and is particularly timely as an aid in the conduct of intensive spring house wiring campaigns. Society members may expect to receive their copies during the month. Non-members interested in obtaining a copy should write to Staff Headquarters, 522 Fifth Ave., New York, N.Y. for information and prices.

Five Snake River Districts Join New Irrigation Project

Organization of the American Falls Irrigation District, comprising five Snake River Valley irrigation projects, with a combined area of 500,000 acres, was effected quite recently, with the approval of \$500 bonds furnished by each of the seven directors elected Jan. 18, and the election of officers of the directorate. R. E. Shepherd, of Jerome, Idaho, was chosen president of the board; W. F. Alworth, Twin Falls, secretary, and W. H. Spence, Kimberly, treasurer.

Confirmation of the district's organization by order of the district court will be followed by call for an election to vote the district's bonds to take up defaulted payments on the part of the participating canal systems for storage water in the American Falls reservoir. Building of the American Falls reservoir by the federal reclamation service has been held up for two years pending an adjustment of this question of defaulted payments.

California Wire Company Gets Two Large Contracts

Two record orders have recently been received by the California Wire Company, Orange, Calif., from southern California utility companies. The first order, given by the Southern California Edison Company, calls for the delivery of 2,000,000 of weatherproof wire at a contract price of approximately \$400,000. The second is for 200,000 lb. of 1,000,000 circ. mil cable for the Los Angeles Railway. This latter order calls for the largest single piece of cable of this size ever made.

The plant of the California Cordage Company, a subsidiary of the wire company, is rapidly nearing completion, and within the next thirty days some of the 5,000 spindles will be operating. This mill will produce the covering material for the weatherproof wire.

Plans Made for A.S.M.E. Pacific Coast Regional Meeting

Preparations are now being made for the first Pacific Coast regional meeting of the American Society of Mechanical Engineers, which will be held in Los Angeles, Apr. 16-18. The usual New York meeting of the council of the society will be transferred to Los Angeles during the regional convention.

The proposed program includes an allotment of considerable time to the discussion of hydroelectric development. H. A. Barre, electrical engineer for the Southern California Edison Company, will present a paper on the mechanical features in hydroelectric design of long distance transmission, and a paper dealing with the industrial and electrical development of the Pacific Coast will be presented by Robert Sibley, Pacific Coast consultant for the McGraw-Hill Company.

It is planned to have the guests at the convention visit the laboratories of Dr. Robert A. Millikan, and also the solar observatory on the top of Mount Lowe. The committee in charge of the convention includes: C. G. Thomas, chairman, H. W. Crozier, H. L. Doolittle, H. R. Hilton and Robert Sibley.



Miss Helen Black, dramatic editor on the Rocky Mountain News, of Denver, Colo., aided the Rocky Mountain Electrical Cooperative League in its campaign to increase the number of electrical appliances in use in the section by showing the public how she does her cooking electrically.

Central Stations Urged to Try for Coffin Fund Prizes

Frank W. Smith, as president of the National Electric Light Association and chairman of the Charles A. Coffin Prize Committee of the N.E.L.A., has issued a letter to all central stations in the country, explaining that every central station in the United States is invited to participate in the awards to be made under the terms of the Coffin Foundation as established by the General Electric Company and announcing further details of these awards.

After speaking of the announcement of the foundation as originally made by the General Electric Company, President Smith states:

"The announcement, in so far as it refers to the central station industry, is broadly interpreted by the committee as providing for the annual award of the Charles A. Coffin Medal to the public utility operating company within the United States which during the year has made the greatest contribution to the development of the general use of electric light and power by the public and to the benefit of the industry.

"The committee suggests that among the factors which will be considered in making the award are the following: the particular initiative, skill and enterprise which has been manifested in popularizing the general use of electrical energy; accomplishments in the development of the efficiency of the company's organization; improvements in construction practice which have resulted in greater reliability of service; marked increases in the efficiency of generation and distribution; the adoption of special plans which have resulted in the largest percentage of increase in new customers; methods adopted of interesting customers in stock ownership; unusual efforts and accomplishments in popularizing and introducing domestic appliances; the extension of service to homes not previously wired and to rural communities.

"The first award of both the medal and the \$1,000 for the central station company's employees' benefit fund will be made for the year 1922. The announcement of this award will be made at the annual convention of the National Electric Light Association in New York City, June 4-8.

"All statements must be in the hands of the committee by March 15. These should be addressed to the 'Charles A. Coffin Prize Committee of the National Electric Light Association' at 130 East 15th Street, New York City."

The N.E.L.A. prize committee consists of F. W. Smith, chairman, Martin J. Insull and Samuel W. Stratton.

Denver Railway Company Builds Electric Locomotives

The Denver & Intermountain Railway Company, of Denver, Colo., has recently completed the construction of an electric locomotive for use on its inter-urban lines. The locomotive was constructed principally from material around the shops of the company and the work was done by the employees in the Denver shop. Motors for the locomotive were purchased from eastern manufacturers and give it about 400 hp.

The new locomotive will replace steam locomotives used by the railway company and it is expected that a con-

siderable saving will result from its use. A second one is now being built and will be placed in service as soon as it is completed. Considerable saving was made by building the two new engines in the local shops as much waste material was employed in assembling them.

Will Start Work on Mystic Lake Hydro Plant Immediately

The Montana Power Company will not wait for spring to start on its Mystic Lake hydroelectric plant. Preliminary work on the pipe line grade and on the penstock incline will be started in the near future. The plans of the company call for the completion of this work by August, and after that work on the power house itself will be started.

The road which had to be built by the company to enable it to transport materials to the dam has already been completed to a point within three-quarters of a mile of the site. A railroad will also be constructed along the pipe line grade to provide service for hauling dam materials.

The power house is to be built in the gorge of the Rosebud River, in the Beartooth Mountains, 43 miles from Columbus, Mont. The capacity of the plant to be installed will be approximately 15,000 hp.

New Railroad to Tap Rich Iron Deposits Is Authorized

Authorization of a 32-mile railroad between Lund and Cedar City, Utah, has been given the Los Angeles & Salt Lake Railroad. According to officials of the Union Pacific system at Salt Lake the new road will be in operation by July 1923.

The line will tap rich deposits of iron in the vicinity and will connect with a system of highways to join Zion National Park, Cedar Breaks, Bryce Canyon and the north rim of the Grand Canyon of the Colorado River. The estimated cost is in the neighborhood of \$800,000.

At a conference held in New York recently it was decided that the American Engineering Standards Committee should be asked to prepare a nationally uniform safety code on walkway surfaces. It was recommended that the sectional committee consider the question of platforms in front of electrical apparatus, especially switchboards and floors around machinery in motion, as to insulation and non-slip qualities. The new code will apply to apartment houses, factories, and other working places, office buildings, hospitals, hotels, and restaurants, railway cars, railway stations, and train platforms, schools and theaters. Sixty-three representatives of trade associations, technical societies, safety organizations and government departments were present at the conference.

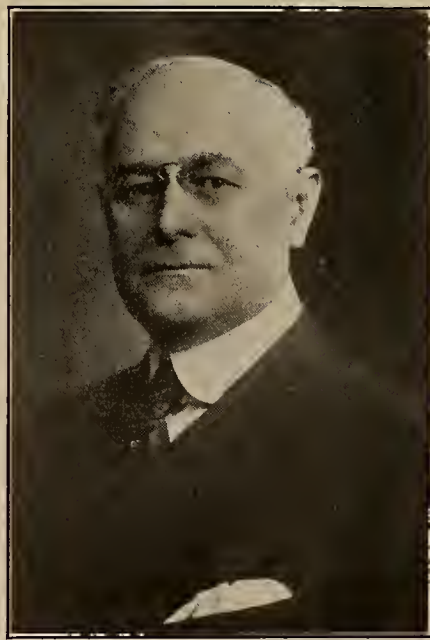
A program of improvement in the city's street lighting system is being carried out in Idaho Falls, Idaho. New heads for the lamp posts will be installed about April 1, to light the main business district along Broadway and Park Avenue. New street signs are also being installed.

Denver League Will Interchange Ideas with Builders

In an effort to secure and maintain a closer contact with the building profession of Denver, Colo., the Denver Electrical Cooperative League is arranging an exchange of speakers with organizations of these trades. The first effort to secure the views of the architects, resulted in the invitation of two of the men to speak before the luncheon of the advisory board. William N. Bowman, a Denver architect, and Donald O. Weese, director of the architect's small house service bureau, were the men who addressed the electrical men at this meeting.

A number of electrical experts have been selected to address the organizations of the building profession in the city and it will be the duty of these men to present facts which will give the builders a better idea of the possibilities of electrical service in the home and the business world. Ideas will be exchanged with realtors, building contractors and investment builders, as well as architects.

The United States Civil Service Commission has announced open competitive examinations for hydrographic and topographic draftsmen and lithographic work. The receipt of applications will close March 27. The examination is to fill vacancies in the Coast and Geodetic Survey, Washington, D. C., at \$1,640 a year, and in positions requiring similar qualifications in other branches.



Samuel Adams Chase, author of the slogan, "Live and help live," and well known to contractor-dealers all over the country for his work in connection with the Goodwin-Chase meetings of three years ago, is again visiting the Pacific Coast territories. This time Mr. Chase is supervising some survey and promotional work for the merchandising department of the Westinghouse Electric & Manufacturing Company. Though Mr. Chase has not felt equal to the strain of public addresses on this trip, his friends are glad to know that his old time vigor showed up well on the Del Monte golf course during the jobbers' convention. Mr. Chase was the first salesman of the Western Electric Company and attributes much of his later success to this jobbing experience.

Los Angeles Electric Club Sees Contractor-Dealers' Play

Members of the Electric Club of Los Angeles were entertained, on Feb. 12, by the contractor-dealers of the organization, who presented the play "Paleolithic Indiscretions of the Professionally Indiscreet" or "Take the New Jail Building, F'rinstance" alias "The Futility of Cooperative Competition." The play was written by L. R. Ardouin, of the United States Steel Products Company, and the characters in the manuscript were taken by members of the Electric Club.

The play showed some of the evils of the estimating system employed by the electrical contractor-dealer and endeavored to show the evils of the present system in a ludicrous manner. The play was well received by the members of the club and caused considerable comment in the industry in Los Angeles. The men who took part in the production were: Jerry Barth, L. E. Darrow, H. S. Detrick, J. G. Marks, H. E. Sherman, Alfred Bachrach and Carl M. Heintz.

New Broadcasting Station Will Be Erected in Denver

Radio activities in Denver have been materially stimulated in the announcement that a new broadcasting station, backed by the leading radio jobbers and dealers in that city, will soon be put in operation. Although radio equipment has been moving well in the Denver territory for some time, a recent report indicates that improved broadcasting facilities are badly needed.

Higher priced sets are moving well in the Rocky Mountain territory. Crystal sets and cheap parts for home assembly are not in demand as much as last fall. Stocks of both jobbers and dealers, are complete and since the holidays there has been a marked standardization. Business in the radio departments of dry goods and stores other than specialty or electrical shops has decreased.

Pipe Line Laid Twenty Years Ago Found in Good Shape

A pipe line, laid twenty years ago, from the forebay to the Alta (Calif.) power house, is now being uncovered by the Pacific Gas & Electric Company. The line was originally laid by the Central California Electric Company which was an electrical connection of the South Yuba Water Company.

The pipe being uncovered is to be thoroughly scraped and painted. The line showed up to be in fairly good shape except at certain places where the ground is wet the year around. In these spots the chemical action has caused the pipe to pit in some places. At these points heavy iron bands will be placed around the pipe.

Government Specifications for Petroleum Products Set

Federal specifications and testing methods covering various petroleum products are given in Technical Paper 323, just issued by the United States Bureau of Mines. The specifications cover motor gasoline, aviation gasoline, naphtha, kerosene, lighthouse kerosene, signal oil, fuel oils, fuel oil for diesel engines, bunker fuel oil, and lubricants.

Under the general heading of lubricants, special specifications are given for aircraft machine gun oil, car and locomotive oil, cup grease, diesel engine lubricating oil, floor oil, gun and ice-making oil, paraffin wax, electric switch oil, rust-preventing compounds, etc.

The testing methods outlined include color tests, cloud and pour tests, determination of viscosity, melting points, flash points, water and sediment, sulphur, etc.

The specifications given were recommended by the Interdepartmental Petroleum Specifications Committee, of which N. A. C. Smith, petroleum chemist of the Bureau of Mines, is chairman, and have been officially adopted by the Federal Specifications Board for the use of the departments and independent establishments of the government in the purchase of materials covered by them.

Butte Electrical Men Organize to Better Industry

Members of the electrical industry in Butte, Mont., have recently formed the Electric Club of Butte. The new organization was founded with two prime purposes, to promote the personal welfare of the members, and to improve electric service for the public. Listed among the members of the club are employees of the power company and of the telephone company in the city, contractors and others from the electrical industry.

M. E. Buck was elected president of the club for the coming year and will hold office with the following men: H. M. Latham, vice-president; K. M. McNeill, secretary, and W. C. Medhurst, treasurer. The club has rooms located in the Montana Electric Building in Butte.

Members of the Electric Club of Oakland, Calif., were addressed by J. David Houser, on Feb. 26. Mr. Houser is a representative of the Bureau of Management Research and spoke on "Human Values in Industry."

H. Arthur Jacobson, a Denver, Colo., jeweler and diamond merchant, was the purchaser of the first electrical home built in Denver. Mr. Jacobson purchased the home after it had been visited by approximately 38,000 people. The home is a two-story one in the heart of the restricted residential district.

The Southern California Edison Company has ordered a number of small transformers which will be installed in its distribution system during the coming year. The value of the apparatus ordered is approximately \$130,000 and the contract for them has been awarded to the Westinghouse Electric & Manufacturing Company.

The United States Circuit Court recently denied the petition of the City of Los Angeles, applying for a rehearing in the condemnation proceedings of the city against the Mono Power Company. The City of Los Angeles was recently prevented from exercising the right of condemning the power company's properties in the Owens River Gorge by the Circuit Court, which reversed the decision of the District Court.

Books and Bulletins

ELECTRIC POWER PLANT ENGINEERING

By J. WEINGREEN. Third Edition.
6 x 9 in. 511 pages. 305 illustrations.
\$5. McGraw-Hill Book Company, New York.

In the third edition of this standard reference book, covering the practical engineering problems of generating plants, transmission lines, and substations, the author has attempted to record the technical progress of the industry since the previous edition was published in 1913. Greater emphasis has been laid on synchronous condensers, open air switches, oil switches and the out-door substations. The material in the text is not limited to American practice for the author takes the stand that the inclusion of European practice and apparatus will also be of interest and value to American engineers.

The chapters on Typical Central Stations and Typical Substations, which together cover about 110 pages of the book, are quite complete for a text of this nature. The chapter on oil circuit breakers is fairly complete and about 46 pages are devoted to this important class of equipment. A considerable portion of the book is devoted to switchboards controlling direct current machinery and to certain details of direct current substations.

While it is realized that it is impossible to cover thoroughly the vast subject of electric power plant engineering in a single text of this size, it is to be regretted that some of the problems are not treated in greater detail and that the most modern equipment is not included. The chapter on lightning arresters, although it covers both American and European equipment, makes no reference to an arrester which has been in successful use throughout the United States for the past few years—the oxide film type. The chapter on relays for the protection of equipment and service does not cover this important subject in sufficient detail and no mention is made of the modern induction type relay which now finds application in all modern central station systems.

An excellent appendix of 16 pages, consisting of tables covering the applicability of wires and cables in transmission and distribution, is included at the end of the book.

E. R. S.

The city electric light plant at Alexander, Idaho, was totally destroyed by fire on Feb. 17, involving a loss of several thousand dollars.

"Optical Methods in Control and Research Laboratories" is the title of a new 56-page booklet published by Adam Hilger, Ltd., of London, England. The book deals with metallurgical and analytical applications of spectroscopy, absorption spectra and spectrophotometry and describes the work of the refractometer and polarimeter. The book is well supplied with illustrations.

Meetings

Better Public Relations Urged at New Mexico Convention

Better public relations was the theme that dominated the various meetings during the Ninth Annual Convention of the New Mexico Electrical Association, Feb. 12 and 13. While there were a large number of papers and addresses dealing with the technical and business side of the public service industry, it was noticeable that even these were tinged with one phase or another of public good-will building.

The convention was held in Albuquerque, N. M., and the attendance was the largest in the history of the association. The manufacturers, jobbers and dealers, as well as the central stations, were largely represented, delegates coming from as far east as Chicago. As a result of the discussions growing out of the various addresses and papers on public relations, this phase of the public utility industry will receive the attention of all of the universities in New Mexico. The State University of New Mexico and Engineering Department of the College of Agriculture already have requested the Rocky Mountain Committee on Public Utility Information, with which all of the New Mexico companies are affiliated, to provide lecture material dealing with various subjects, such as that now being widely utilized in all of the universities and colleges of Colorado.

E. A. Bradner, of the Las Vegas Light & Power Company, Las Vegas, was elected president of the association, to succeed D. E. Bent of the Tucumcari Light & Power Company, Tucumcari. Charles E. Twogood of the Albuquerque Light & Power Company, was re-elected secretary.

Those who delivered addresses or read papers were: B. C. J. Wheatlake, General Electric Company, Denver; J. E. Moorhead, Mountain States Telephone & Telegraph Company, Denver; C. A. Winder, Southwest General Electric Company, El Paso; Dr. John D. Clark, State University of New Mexico; George E. Lewis, executive manager, Rocky Mountain Committee on Public Utility Information, Denver; Professor R. W. Goddard, State College of New Mexico; J. F. Dostal, Colorado Springs Light, Heat & Power Company and president of the Rocky Mountain Division of the National Electric Light Association; M. Nash, electrageist, Albuquerque.

Los Angeles Electrical Men Call New Officers to Duty

Officers for the 1923-24 term were elected by the members of the Electric Club of Los Angeles at the regular meeting held Feb. 12 at the Hotel Alexandria, in Los Angeles. R. E. Smith of the Southern California Edison Company was elected president of the club and during the coming year he will be aided by the following vice-presidents: Carl A. Heinze, Bureau of Power & Light; Ben Wright, Southern California

Telephone Company; and P. H. Booth, Edison Electric Appliance Company.

The position of secretary-treasurer of the club will be held by Carl M. Heintz, Westinghouse Electric & Manufacturing Company. R. H. Manahan, City of Los Angeles, was elected sergeant-at-arms. The executive committee of the club for the coming year will consist of: H. W. Allen, Graham-Reynolds Electric Company; J. O. Case, General Electric Company; W. L. Frost, Southern California Edison Company; D. C. Pence, Illinois Electric Company; C. Thorburn, Pacific Electric Railway Company; and H. H. Walker.

The Rocky Mountain Electrical Co-operative League has recently moved its offices from the Kearns Building to the McIntyre Building in Salt Lake City, Utah. More adequate facilities are provided the league officers in the new quarters.

Engineers of the San Francisco Bay region have been invited to attend the Engineers' Day to be held on the University of California campus at Berkeley, from 1 o'clock in the afternoon to 9 o'clock in the evening, on March 16. Students of the College of Engineering will act as guides for the visitors and will endeavor to show the engineers all of the equipment in use on the university campus.

Tentative dates for the Annual Convention of the Northwest Light & Power Association, which will be held in Seattle, Wash., have been set by the committee in charge of the convention. The dates at present are June 27-30, inclusive. The committee in charge of the convention includes the following men: N. W. Brockett, Puget Sound Power & Light Company, Seattle, Wash.; R. M. Boykin, North Coast Power Company, Portland, Ore.; L. A. Lewis, Washington Water Power Company, Spokane, Wash.; George L. Myers, Pacific Power & Light Company, Portland, Ore.; and George M. Nevins, Pacific Power & Light Company.

COMING EVENTS

- American Society of Mechanical Engineers—
Pac. Coast Regional Meeting—Los Angeles, Calif.
Apr. 16-18, 1923
- National Electric Light Association—
Annual Convention—New York, N. Y.
June 4-8, 1923
- Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923
- American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Sept. 26-29, 1923

The largest convention of contractors ever held in the state of Washington took place on Feb. 9-10, when the annual meeting of the Pacific Northwest Branch of the Associated General Contractors of America was called to order by President A. S. Downey of the Northwest branch. Approximately 155 members of the association in the Northwest were present, and the two-day program was filled with interesting and constructive business sessions.

San Diego Electric Club Elects New Body of Officers

J. F. Zwiener, of the Hartwell Electric Company of San Diego, Calif., was elected to the presidency of the Electric Club of San Diego, at the annual meeting of the club, Jan. 30, at the San Diego Hotel in that city. He succeeds Walter C. Wurfel in the executive office.

Elected at the same time were A. E. Johnstone, first vice-president, Charles R. Dent, second vice-president, P. P. Pine, secretary-treasurer, and B. E. Barth, G. H. P. Dellmann, Charles Weiss, C. C. Clardy and W. C. Wurfel, who were named on the executive committee.

Arthur Spring, field representative of the California Electrical Cooperative Campaign, in introducing his successor, F. N. Smith, outlined a plan for an electrical home for San Diego. The club in this session voted to assume the responsibility of having erected for display an electrical home in San Diego, according to the plans outlined by Mr. Spring. Advertising of the home was



J. F. Zwiener, newly elected president of the Electric Club of San Diego

described by Mr. Spring as entirely educational and free from commercialization. He explained how the various electrical features of the home would be installed by lot, and how the demonstration of the electrical advantages would be conducted. Literature relating to the electrical home would be furnished by the Campaign, he explained.

The annual meeting of the club was in the nature of a banquet, with an attendant program of music and dramatic numbers.

In the first meeting of the club following the election, held on Feb. 6, the retiring secretary, Sam Hall, reported that the club membership, both resident and non-resident, totaled 80. In this meeting, amendments to the constitution of the club were made, creating a Better Business Methods Committee, whose duties would be to cement better relationships between the individuals and classes in the electrical industry in San Diego.

A membership drive of 30 days' duration was launched at the time, with prizes to be awarded to the member most successful in bringing in memberships.

President Zwiener appointed a committee, consisting of A. E. Holloway, chairman, Geo. Garrettson, J. F. Munro, Bruno E. Barth and W. C. Wurfel, to take charge of the electrical home arrangements.

Personals

K. E. Van Kuran will retire from the presidency of the Los Angeles Electric Club on March 5. Mr. Van Kuran, who is district manager of the Westinghouse Electric & Manufacturing Company and vice-chairman of the California



K. E. VAN KURAN

Electrical Cooperative Campaign, was elected president a year ago to preside over the club's activities during the second year of its history. He succeeded as president, Harry L. Harper, district manager of the Western Electric Company, who led the club to prosperity and success during the first year. Mr. Van Kuran's tenure of office has been marked by his efforts in keeping the club to the fore in this section, and by the recognition which has been accorded it. Under his guidance a close relationship has grown with the Los Angeles Chamber of Commerce, which for the first time recognized the electrical industry by having a member of the industry on the Merchants and Manufacturers Committee. This resulted during the past summer in the Electric Club sponsoring the Electrical Exposition at California's Pageant of Progress and Industrial Exposition under the auspices of the Los Angeles Chamber of Commerce which proved to be such a success. Although the second year of the club's history has been a trying one and Mr. Van Kuran's task has been a most arduous one, he relinquishes command to President-elect Dick Smith of the Southern California Edison Company with the club in excellent circumstances, and with an ever-increasing membership.

Henry Cahn of the Cahn-Forster Electric Company in Denver, is one electrical man who can boast of an electrical home. The house, a seven-room bungalow, is located in the new Seventh Avenue district, and is credited with everything from plenty of convenience outlets to an electric refrigerator.

S. W. Bishop, executive manager, Denver Electrical Cooperative League, has been elected commander of the largest American Legion post in the state of Colorado.

A. B. Fletcher, who recently resigned as head of the California Department of Public Works, has been appointed chief engineer of a commission which is charged with solving the transportation problems of the six New England states. The commission consists of the governors of the six states and the presidents of all of the important railroads involved. It will undertake to work out a comprehensive scheme for highways and railroads of that section, showing how motor transportation may be complementary to railroads instead of competitive. Mr. Fletcher has been connected with the construction of highways in California for the past eleven years.

F. D. Winegar, chief electrical inspector for the city of Salt Lake, was the principal speaker before the recent meeting of the Salt Lake section of the American Institute of Electrical Engineers. Mr. Winegar spoke on the subject of "Industrial House Wiring" and illustrated his talk with a number of exhibits of modern wiring appliances.

P. O. Crawford, chief engineer of The California Oregon Power Company, recently attended meetings of the technical section of the National Electric Light Association held in New York City.

Jerome Blaisdell, formerly connected with the Portland Railway, Light & Power Company, and more recently in charge of the engineering department of the Depew and Lancaster Light, Power & Conduit Company, Lancaster, N. Y., has resigned to become general superintendent of the Central Michigan Light & Power Company of Alma, Mich.

T. A. Cranston, of the Portland office of the General Electric Company, is a recent San Francisco visitor.

Hylon T. Plumb, vice-president of District 9 of the American Institute of Electrical Engineers and electrical engineer attached to the Salt Lake office of the General Electric Company, was the guest of honor at a recent meeting of the Denver section of the Institute. In addition to addressing the members on the aims and activities of the organization, Mr. Plumb gave an illustrated talk on "Radio Communication."

H. S. Walker, former member of the sales force of the Denver office of the Westinghouse Electric & Manufacturing Company, has been transferred to the Salt Lake office of the company.

A. Y. Tait of the Electrical Construction Company, Shanghai, China, is a recent San Francisco visitor.

L. C. Richards, manager, electric service department, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., recently inspected the new quarters of the Los Angeles office of that company.

J. Max Lee, formerly with the Southern California Electric Company of Los Angeles, where he was in charge of the contract estimating department, has joined the Westinghouse Electric & Manufacturing Company's Los Angeles office.

A. F. Meyer, of the Chicago offices of the Byllesby Engineering and Management Corporation, was a recent visitor at the Western States Gas & Electric Company headquarters at Stockton. His trip included an inspection of the new power development of this company on the American River.

H. K. Griffin, who has been connected with the electrical industry in California for several years past, has been appointed commercial agent in charge of new business for the Western States Gas & Electric Company at Stockton, California.

Frank N. Briggs, independent candidate for mayor at the coming election in Denver, addressed the local chapter of the American Institute of Electrical Engineers in that city, Feb. 16, on the "Possibilities of Denver as an Electrical City."

F. F. McCammon, of the Denver Gas & Electric Light Company, addressed the students at Colorado College in Colorado Springs on "The Place of the Utilities in Industry," Feb. 14.

W. H. Hodge, manager of the advertising and publicity department of the Byllesby Engineering and Management Corporation, has returned to Chicago after a two weeks' visit at this company's California operated properties, the Western States Gas & Electric Company at Stockton, and the San Diego Consolidated Gas & Electric Company. Mr. Hodge returns to Chicago much impressed by the continued growth of Pacific Coast public utilities. He also remarked concerning the interest with which the campaign and defeat of the California Water and Power Act was watched in the East.

Samuel Kahn, vice-president and general manager of the Western States Gas & Electric Company, has returned from a brief business trip to Chicago.

E. C. Headrick, past chairman of the Electrical Cooperative League in Denver and a prominent electragist of that city, has been elected a member of the executive committee of the Association of Electragists-International, to represent the mountain region. Mr. Headrick was nominated at the Cincinnati convention of the association last October and in his election succeeds



E. C. HEADRICK

R. H. Eardley of Salt Lake City, Utah. Mr. Headrick before his elevation to the office in the electrical league last year was president of the Denver Association of Electrical Contractors and Dealers for several terms. He attended the first electrical league conference at Association Island, N. Y., in September as the representative of the Denver league and on his return took part in the contractors' national convention at Cincinnati.

H. E. North, for many years connected with various Byllesby companies, has been transferred from the Oklahoma Gas & Electric Company at Oklahoma City to the Western States Gas & Electric Company at Stockton, California. Mr. North was in the stock sales department at Oklahoma City for several years and now comes to California to take charge of the Western States Gas & Electric Company investment department. This company has just been accorded permission by the Railroad Commission to sell \$500,000 of 7 per cent preferred stock to provide funds for new construction. Mr. North will direct the sale of this issue which will be sold on the "Customer Ownership" plan which has proven so satisfactory to public utilities.

D. H. Foote, secretary of the Pacific Gas & Electric Company since 1907, has been given the title of third vice-president of the company in addition to that of secretary. Mr. Foote is a native of Philadelphia, and the greater part of his business experience, which was along banking lines, was gained in the position of secretary and treasurer of the Union Trust Company of that city. He came to California in 1901, and, upon the organization of the California Gas & Electric Corporation, in 1903, he became its first cashier and assistant secretary. In 1905 the Pacific Gas & Electric Company was organized and in July, 1907, Mr. Foote was elected to the responsible position of secretary of the company. In 1909 he was elected a member of the board of directors and later, in 1910, was also appointed assistant treasurer. Ever since his connection with "Pacific Service" Mr. Foote has had charge of the details of cash



D. H. FOOTE

and banking operations of the company, as well as the issuance and transfer of stocks and bonds, his banking experience especially fitting him for this highly technical class of activity. As secretary, Mr. Foote has had custody of the corporate records, documents and indentures which are deposited in the company's archives. His secretarial activities have included the disentangling of many perplexing problems in connection with the corporation records of various subsidiary companies which were consolidated with the Pacific Gas & Electric Company.

E. J. Mehren, editor of Engineering News-Record and vice-president of the McGraw-Hill Company, Inc., has returned to his New York offices after several weeks spent in the West. Mr. Mehren was one of the principal speakers on the program of the Associated General Contractors of America convention in Los Angeles. Later he inspected parts of the California State highway system. While in San Francisco he was the guest of the Engineers' Club, addressing the members on "Impressions of the Present Trend of Engineering Progress."

Clare N. Stannard, vice-president and general manager of the Denver Gas & Electric Light Company, spoke before the Capitol Hill Improvement Association, the largest organization of its kind in Denver, Feb. 12, on improvements to be made by his company early in the spring.

Dean D. Clark, Denver commercial manager of the Mountain States Telephone & Telegraph Company, has been appointed as the representative of his company on the Advisory Board of the Electrical Cooperative League in that city.

Mrs. Helen Grahame, formerly of New York, has recently been employed by the California Electrical Cooperative Campaign as a field representative. Mrs. Grahame, who is a graduate of Ohio State University, has had considerable experience as a writer of fiction and as a newspaper writer, and will endeavor to co-ordinate the interests of the Campaign with the women of southern California by calling on women's clubs, parent-teachers' associations and other organizations. Mrs. Grahame has been in Los Angeles two years. This is the first step in this direction made by the Campaign in this section and should materially aid the work of that organization by gaining the support of the women in furthering electrical ideas.

Thomas E. Banning, secretary of the public utilities commission of Utah since its creation in 1917, resigned Feb. 15 to become traffic manager of the Columbia Steel Corporation. Mr. Banning was born in Missouri in 1884. He came to Utah in 1905, and since that time has been engaged in transportation and traffic work. He was first employed in Utah by the San Pedro, Los Angeles & Salt Lake Railroad at Milford as warehouseman. He later became identified with railroad rate work. With the establishment of the public utilities commission in 1917 Mr. Banning became the secretary, and during his term of service on the commission has been recognized as an authority on freight rate structures in the Intermountain country.

Hamilton F. Gronen, ex-city commissioner of Tacoma, has been chosen to succeed W. J. Roberts as chief engineer of the inter-county river improvement by the King and Pierce county commissioners. Mr. Roberts has been engineer in charge for nine years, and will return to his practice of civil engineer. Mr. Gronen's work will consist of straightening and otherwise improving the Puyallup waterway to allow it to carry the increased volume thrown into it 10 years ago, when the flow of the White River was cut over into the channel of the Stuck River.

R. A. Balzari, manager of the industrial division of the San Francisco office of the Westinghouse Electric & Manufacturing Company, is retiring from the presidency of the San Francisco Electrical Development League, after one of the most successful years in the history of that organization. Interest in the League has been manifested by the particularly large attendance at the meetings and the increasing number of members. One of the most noteworthy accomplishments was the manner in which the members worked during the campaign against the late Water and



R. A. BALZARI

Power Act. Mr. Balzari began his career in the electrical industry with the Pacific Gas & Electric Company and entered the San Francisco office of the Westinghouse company in 1908. He has taken an active part in the Pacific Coast Electrical Association and in the California Electrical Cooperative Campaign. During the past year he represented the Development League at the meeting of delegates of such organizations at Association Island, N. Y.

Harry Sessions, commercial engineer, Southern California Edison Company, has just returned from an extended trip throughout the East checking up various shipments for his company. While away Mr. Sessions visited Cleveland, New York, Pittsburgh, Schenectady and other cities, visiting the various manufacturing plants of electrical apparatus located in those places.

Obituary

Walter F. Brown, general traffic manager of the Mountain States Telephone & Telegraph Company, Denver, died recently following a short illness. Mr. Brown, who had been in the telephone business for twenty-five years, was one of the most active public utility men in the Intermountain district. He was president of the Colorado Public Service Association and a member of the Rocky Mountain Committee on Public Utility Information. He was a member of the class of 1893 of Yale University.

Otis B. Moorhead, radio inventor and former president of the Moorhead Laboratories of San Francisco, died in his home at Alameda, Calif., recently.

Manufacturer, Dealer and Jobber Activities

C. Brandes, Inc., of New York City, recently conducted a sales meeting at which the outlook for the coming year in the radio business was discussed. The consensus of opinion was that the combined radio and electrical show to be conducted in San Francisco by the American Radio Exposition Company would aid the industry considerably.

The Packard Electric Company, of Warren, Ohio, has named L. J. Smith as its Los Angeles representative. Mr. Smith was formerly with the telephone company in Los Angeles and later was associated with the Pacific Electric Company there. His headquarters are at 451 East Third Street.

The Schweitzer-Alexander Company has recently been incorporated for the purpose of manufacturing and selling electric lighting fixtures at 1233 West Pico Street, Los Angeles. Comprising the new organization are E. J. Schweitzer, Walter Alexander and Arthur Schweitzer, all of whom were formerly with the Wagner-Woodruff Company of Los Angeles, E. J. Schweitzer having been secretary-treasurer of that concern for a number of years.

The Emerson Electric Manufacturing Company, of New York City, in its monthly house organ, has devoted considerable space to the description of electric fans. Several installations are presented in the publication.

The Edison Electric Appliance Company, Inc., of Chicago, Ill., has recently placed on the market a new type of Hotpoint iron. Several improvements have been made in the design of the iron and in trials conducted by the Southern California Edison Company, the iron has been found to be even more satisfactory than those sold in the past.

The Westinghouse Electric & Manufacturing Company has recently published folders No. 4471A, 4512, and 4522, which describe the company's line of small testing instruments. Folder No. 4484 is devoted to the description of the line of meter service switches manufactured by the company. Any of the folders may be obtained by addressing any of the offices of the company.

The Industrial Electric Company, of Los Angeles, Calif., has recently secured a lease on a new brick building in the southern California city, and has moved to the new location at 1215 Santa Fe Avenue. The company manufactures special electrical machinery, the two principal products being the Industrial Constant Potential and the Perfect Floor Sander.

The Allis-Chalmers Manufacturing Company, of Milwaukee, Wis., in Bulletin No. 140, has described many types of electrical installations in sawmills which have been electrified. The booklet shows applications from the log pond to the storage yard. The booklet is well illustrated and shows how the sawmill operator can successfully use electricity in his mill.

J. W. Hancock, patentee and manufacturer of Columbalites, and a prominent electragist of Denver, Colo., as part of his business expansion program, has reincorporated his company and it

is now known as the John Hancock Electrical Company. A new shop and warehouse has been established at 1412 Wazee Street while the office and display rooms will remain at 1630 Welton Street.

The Wise-McClung Manufacturing Company, New Philadelphia, Ohio, has appointed G. B. Gaiennie as general manager of the Sunshine Sales Company, with offices in Cleveland, Ohio. Mr. Gaiennie was for a number of years western manager of the Brokaw-Eden Company and until lately was general sales manager of the Gillespie Eden Corporation in New York City.

Hall Brothers Cedar Company, formerly of Jacksonville, Tex., has recently moved to Coeur d'Alene, Idaho, and will engage in the manufacture and wholesaling of western red cedar posts, poles and piling.

The Terry Kitchen Device Company, New York City, has placed upon the market an electrically-heated and electrically-operated hotel-type toaster with a capacity of 1,200 slices of toast per hour. The toaster has been developed under the direction of Robert B. Basham.

D. D. Sturgeon, the first contractor-dealer in Denver to feature the name "electragist," in anticipation of prospective business has purchased a three-story building at 1524 Court Place, opposite the court house and adjoining Denver's electrical row on upper Fifteenth Street. He expects to move from his present location at 1420 Curtis Street at the expiration of his lease.

E. H. Frazier, Rocky Mountain distributor for Delco light products, conducted a sales conference of two days' duration late in January which was attended by his sales representatives from Montana to Mexico. H. W. Pryor, assistant sales manager, Delco Light

Company, and J. A. Harlan, in charge of Frigidaire sales, both from Dayton, Ohio, were the principal speakers. Considerable attention was given to the selling of washing machines and automatic refrigeration.

The R & S Electric Shop, a new contractor-dealer store, has been established at Delano, Calif., by Elmer Robinson and Frank V. Seaman. Mr. Seaman will act as proprietor of the new store.

The Apex Distributing Company, of Denver, which since its organization a year ago, has maintained headquarters in a downtown office building, has leased half of the ground floor of the new Wilda Building at 1437 Welton Street in that city. Plans have been completed for doubling the sales force with the intention of starting a house-to-house campaign covering every corner of the city.

The Mine & Smelter Supply Company, one of the largest electrical jobbing houses in Denver, staged its annual party for employees and their families at the Denver Woman's Club, Feb. 3.

M. R. Price has taken over the business of the East Denver Electric Company at 2720 Larimer Street in that city and has given it the name of Reliable Electric Company. In keeping with the enlargement, membership in the Denver Electrical Cooperative League has been secured.

The Red Lodge Electric Company, Red Lodge, Mont., has recently purchased the stock of the Treasure City Electric Company and is now the only exclusive electric appliance store in the city. The company is making plans for the broadening of its business activities. The company will increase its efforts to introduce the Colly storage battery, a Red Lodge product.



"SAYING IT WITH BLOSSOMS"

No. Gentle Reader, this is not a picture of the opening of the Bon Ton Florists, at their new store on Main Street, with Mr. Bon Ton in the middle foreground. The gentleman busily engaged in looking pleasant is G. A. Buckley, newly appointed western sales manager for the Apex Electrical Distributing Company. "The Boys" of the organization presented the floral decoration on the occasion of the announcement of his promotion—hence the "look pleasant" expression on his face.

Trade Outlook

San Francisco

General business conditions in San Francisco are showing a tendency to become steadier each month. January building permits were over those of December and of January, 1922, and February figures indicate that the advance will not stop at this time. The petroleum industry of the state has also shown a marked increase in production, January records showing the daily production to be 530,885 bbl. Oil companies have at the present time more oil in storage than they have had at any time in the past.

The increase in the price of raw materials has not retarded manufacturing in the San Francisco Bay region, as buyers are showing confidence in the prevailing prices, which are slightly higher than they were a year ago. Both retailers and jobbers report business good and collections have been summarized as fair to good.

Shippers of San Francisco as a whole are well satisfied with the recent decision of the Interstate Commerce Commission unifying the control of the Southern Pacific and the Central Pacific. Several men well versed in shipping problems have stated that California shippers will be protected by the decision of the commission and that benefits will accrue to the region as a result.

Seattle

An unexpected and unusually severe snowstorm the second week in February practically paralyzed business for a few days, and caused the close-down of practically all the lumber and logging camps in the Puget Sound district. As a result, numerous lumber mills which could have continued operations, will be closed by shortage of logs. The inclement weather also brought construction activities to an abrupt halt, although building had been particularly heavy all during January and the first week in February. Some very important contracts have been let and others are pending, so that building will undoubtedly be very active with the return of good weather.

Slight wage increases are noted, particularly in lumber mills and logging camps, where a general increase of five cents an hour has been announced. Employment situation has been very satisfactory, and the ratio of unemployed has been kept down since the first of the year.

Spring jobbing and retail sales in January were very satisfactory in all lines, and considerably heavier than in January of a year ago, despite an unexpected slump following the holiday season.

Electrical jobbers report a very healthy condition in their business during the month of January, with a good start in February, which has slowed down due to snowstorm. Jobbers are inclined to be cheerful over the pros-

pects for the coming season, and predict a good run of business. A slight advance is noted in some materials, with a shortage in other lines, notably conduit.

The general business situation is poor but merchants and manufacturers are optimistic as to the present year's prospects, and believe that the Spring business will be satisfactory.

Denver

Metal and coal mining in the Denver region is in better shape than for several years past. Increased demand and cold weather are the factors immediately responsible but it is generally felt that industrial activity throughout the region is the basic cause. Prices of Wyoming crude oil are booming, the beet sugar industry is profiting from the world-wide shortage of sugar, railroads are making extensive improvements, and a large number of central stations in this territory are adding to the generating and transmission equipment to take advantage of this new business.

Public utility reports for 1922 show a remarkable gain in new customers, the population of Colorado alone increasing 53,629 during the past year. Even with this increase, industrial and employment conditions are improving rapidly, possibly a trifle too fast to warrant recent and contemplated wage increases to building craftsmen. In several lines, wage schedules are equal to the war-time peak.

Electrical materials, especially those containing copper, are increasing in price. Conduit and armored cable supply is weak. Demand is heavy for pole line hardware and wiring devices. Radio business is rapidly improving. Local jobbers report credit conditions in outside territory generally good with no failures since the first of the year.

Salt Lake City

The general business outlook in the Intermountain section continues to be exceedingly favorable. With the prices of metals at their present figure the mining industry is thriving and constantly expanding. The Utah Copper Company at present is approaching its normal production. New units are being put in shape at the Magna mill, and with the copper market growing stronger, and the demand for this metal increasing, it is forecasted that this company will soon be producing at its normal capacity.

"Intermountain Products Week" was featured from Feb. 12 to 17, concentrated effort being made by merchants, manufacturers, commercial clubs, and in fact everybody concerned, to impress the citizens of the section with the importance of encouraging local industry.

The agricultural situation looks much more promising than at this time last year. Sugar companies have reached

a liberal settlement basis with beet growers for the coming season's crops, and an unusually large acreage of sugar beets is looked for. Present market conditions indicate that all of the 1922 crop will be consumed and that the present year's crop will be all marketed at a high price.

Electrical dealers are featuring washing machine campaigns for the month of March, with intensive sales work.

Building activities are expected to open up more extensively than ever with the coming of spring.

Collections are reported as fair.

Los Angeles

For the first half of February, 1923, the building department of Los Angeles issued 2,202 permits with an estimated valuation of \$6,409,574 as compared with 1,675 permits with an estimated valuation of \$5,367,267 for the corresponding period a year ago. This represented an increase of approximately 20 per cent in volume of construction. Building permits have been taken out so rapidly that the city building inspector is swamped with work and cannot keep up with the demand. This activity is true in the territory outside of Los Angeles as indicated by the report of 35 cities which shows for the month of January, a total of \$8,405,585 as compared with \$5,246,837 for the same month in 1922 and \$6,825,128 for December, 1922.

Bank clearings for the first half of February amounted to \$242,778,162.14, which compares with the same period of 1922 with \$176,013,011.69, as an increase of about 40 per cent.

The building program, which shows no sign of a let down, continues to be the dominant factor in the upkeep of the sale of large quantities of electric wiring material and devices and all the local jobbers report extraordinary sales. This is true, somewhat, of appliances also, but at the present time there is a lull in the sale of electrical heaters due to the change in weather conditions. Other appliance sales continue at an unabated pace. This is true of the larger and smaller devices.

Portland

General business conditions during the last half of the month show no marked change over the preceding period. A strong feeling of optimism for the coming year is still evident. The severe cold weather, accompanied by heavy snows, has had some influence on retail buying and has seriously hampered lumber companies in getting out their logs. Those mills not situated on the river were most affected. The orders for lumber continue to pour in. So far this year there has been no great advance in price although the tendency seems to be slightly in that direction.

Practically all of the larger power companies in this district are at work on important developments. The year is sure to be a busy one in all that pertains to electrical construction.

Manufacturers are quoting longer and longer shipments on power apparatus, lead covered cable, etc., causing some anxiety among power company engineers for the next winter loads.

Construction News

Bridges

Calif., Martinez—A franchise to construct a suspension bridge across the Carquinez Straits was formally granted to the Rodeo Vallejo Ferry Company recently by the Contra Costa supervisors, following receipt of a letter from W. F. McClure, state engineer, stating he had ratified the amended Rodeo Vallejo Company plans. Actual construction of the bridge now hinges on the approval of the war department.

Calif., Yuba City—An estimate of \$188,000, exceeding the original estimate of \$13,000, has been made by Engineer Earl Cope as the probable cost of constructing the proposed causeway to connect the new Feather River bridge at Nicolaus in this county with the west levee of the river. A requirement made by the state reclamation board that the spans in the trestle be 40 ft. in length is declared the reason for the increased estimate. The causeway will be 2,201 ft. long and of the same type as the Yolo causeway.

Ore., Hood River—The Hood River-White Salmon Columbia Bridge and Port Association has been organized to promote the proposed new bridge across the Columbia. A survey of the river has been made by engineers who state that it is possible to construct such a bridge at a cost of \$375,000. Hood River and White Salmon have been asked to subscribe \$75,000 in preferred 6 per cent stock toward financing the bridge.

Wash., Chehalis—The Lewis county commissioners have directed Roy Greene, engineer, to prepare plans and specifications for a new steel bridge across the Chehalis River at Claquato, 3 miles west of Chehalis. It is estimated that the bridge will cost \$25,000 for a span of 200 ft. It will be built to the west of and directly alongside the present structure in order to make possible the further straightening of the roads approaching it on each side of the Chehalis River.

Wash., Montesano—The contract for the construction of a new steel bridge across the Humpulips River near Wilderness, has been awarded to the Union Bridge Company of Portland and Seattle. The bridge planned is a 200-ft steel span and will rest on concrete piers, contract being for \$39,765.

Buildings (Industrial)

Calif., Oakland—The Nielsen Packing Company will give Oakland its first big industrial addition of 1923. Announcement was made by the new industries department of the Chamber of Commerce today that this corporation has commenced the erection of one of the most modern plants in the state, on Ninety-eighth Avenue. The first unit, which will cover two acres, will provide 75,000 sq. ft. of operating floor space, and will be completed and ready for occupancy by May 15. It will be located on land immediately adjacent to the ten-acre site owned by the Palmolive Company. The Nielsen Company is making a \$300,000 initial investment, and will pack 200,000 cases of fruit and tomatoes in 1923. Employment will be given to 250 women and 100 men. E. Nielsen is president; P. A. Nielsen, vice-president, and E. H. Nielsen, Jr., secretary.

Calif., San Francisco—Applications for permission to erect two \$80,000 modern garages—one on Geary Street, west of Scott Street, and the other on Golden Gate Avenue, east of Buchanan Street—were approved recently by the fire committee of the board of supervisors. Clary

Sloan will build the Geary Street structure and E. Cavellini the other. Supervisor Con Deasy, chairman of the fire committee, declared that both buildings will be of the most modern type.

Colo., Denver—The largest garage in the residential section of the city will be built by Dutton & Kendall, prominent local builders, at Thirteenth and Ogden Streets. Accommodations will be provided for 400 automobiles at an estimated cost of \$85,000.

Ore., Vernonia—Construction of the mammoth sawmill plant by the American Lumber Company, a subsidiary of the Central Coke and Coal Company of Kansas City, will go forward with the opening of spring, it was announced officially. The contract for placing foundations for machinery and heavy equipment has been awarded to the Milwaukee Bridge & Iron Company.

Ore., Astoria—The Crystal Ice & Storage Company of Portland has concluded a deal for the purchase of a building site for a new ice cream and ice manufacturing plant. The building will be 50 x 100 ft., with a high basement and one and one-half stories above. The cost is estimated at \$40,000.

Wash., Woodland—The Wall Lumber Company has purchased a site near this city on which will be erected a lumber manufacturing plant with daily output of 89,000 feet.

Wash., Tacoma—The Wheeler-Osgood Company plans a three-story reinforced concrete addition to its sash and door factory, the new building with its equipment to cost \$250,000.

Wash., Anacortes—The E. K. Wood Lumber Company plans the construction of a new lumber mill here, to have daily capacity of 300,000 feet, and to employ 300 men.

Wash., Spokane—The White Pine Sash Company, here, will install a bank mill on the Spokane River, near Kettle Falls, to cost between \$65,000 and \$75,000. Henry G. Klopp, president.

Wash., Spokane—Work of rebuilding the Cranston-Brewer box factory here will be undertaken at once, at a cost of \$25,000. O. Z. Brewer, president.

Wash., Vancouver—Plans for immediate construction of the proposed paper mill in this city by the Columbia River Paper Company were completed at a recent meeting of directors, at which F. W. Leadbetter was elected president. The proposed work includes erection of a paper and pulp mill, sulphite mill, lumber mill and box factory, with a payroll of 550 men.

Wash., Olympia—The Olympia Veneer Company plans the expenditure of \$30,000 in extensions and addition to its plant, including some new equipment.

Buildings (Miscellaneous)

Calif., Los Angeles—Club—Architects Allison & Allison, 1405 Hibernian Building, have completed plans and will take bids soon for erecting new club building on Figueroa Street between 9th and 10th Streets, for the Friday Morning Club. It will be 6-story, class A, reinforced concrete construction, stone and stone exterior, hardwood trim, elevators; \$500,000. Bids will be taken on segregated contract basis.

Calif., Los Angeles—Store—Hotel—Architect W. J. Saunders, 227 Laughlin Building, has prepared plans and is taking bids for erecting a 6-story class A store and hotel building, at northwest corner of 9th and Beason Streets, for J. L. Murphy. It will contain five stories, lobby, dining room and kitchen in the first story, and 165 guest rooms with 100 per cent

baths, in the upper stories. Reinforced concrete construction, 95 x 155 ft., cement plaster exterior, composition roofing, plate glass windows, pine trim, 2 elevators, steam heating, vacuum cleaning. Terrazzo floors in bathroom, tile and Terazzo floors in lobby.

Calif., Pasadena—Apartments—Postle Company, architects, 633 Van Nuys Building, is preparing plans for a 10-story, class A, own-your-own-apartment house to be erected on Colorado St., Pasadena. It will be class A construction and will cost \$1,250,000. The project is being promoted by Ellis Bishop & Company of Pasadena.

Calif., Hermosa Beach—Theater—Architect Richard D. King, 519 Van Nuys Building, is preparing plans for a 2-story brick theater, bank, store and office building, to be erected at 13th St. and Hermosa Ave., Hermosa Beach, for First Bank of Hermosa Beach. It will contain a theater auditorium, 3 stores, banking room and 10 offices; 95 x 130 ft., brick construction, terra cotta facing, plate glass, steel beams, composition roofing, pine trim, marble and tile work, gas heating.

Calif., Los Angeles—Hotel—Architect H. W. Charlton, 332 San Fernando Building, is preparing plans for a 4-story class C hotel building to be erected on 6th St., between Bixel St. and Beaudry Ave., owner withheld temporarily. Brick, 58 x 143 ft., 4-story with basement, art stone front, composition roofing, terrazzo, cement and Oregon Pine floors, steam heating system, stone walls and ceiling in lobby, electric automatic elevator, unit water heating system, plate glass, marble work, plaste baths, caen stone mantel, ornamental iron and bronze work; will contain 2 stores, lobby and 100 rooms, each with bath.

Colo., Denver—Apartments—D. M. Waldman, Denver restaurant man and apartment house builder, has announced plans for another apartment building, the exact duplicate of the one now under construction at East Ninth Avenue and Humboldt Street, to be located directly opposite on Ninth Avenue and to be connected by an illuminated ornamental archway spanning the street. Forty-two apartments are provided in the new plans and when completed the two apartment houses with the connecting arch will represent an investment close to \$1,000,000.

Colo., Denver—Sanatorium—Construction work on the first three units of the Swedish National sanatorium, ultimately to be the largest tubercular sanatorium in Colorado, will commence April 1, according to Mountjoy & Frewen, the supervising architects. The completed buildings, to cost more than \$500,000, will cover approximately two blocks of land. A power plant and laundry are included in the plans. Dr. C. A. Bundsen and Gustaf Nyall of the present sanatorium staff are in charge of the new project.

Colo., Denver—Stores—Offices—At a cost of approximately \$365,000, new units will be added to the Imperial Building at Fourteenth Street and Court Place, with actual construction starting in the early spring, according to Dr. Cuthbert Powell, representing the association for medical men which remodeled the Imperial apartments, the first unit of the project. The main wings will be five stories in height and will be of brick and red sandstone to correspond with the present building. Varian & Varian are the architects.

Dams

Calif., Martinez—The division of water rights of the state department of public works has granted authority to the town of Antioch to divert water from streams in that section for municipal purposes. The town intends to construct a dam in the hills nearby insuring a supply of water that will eliminate its dependence upon the Sacramento River. The estimated cost of the project is \$60,000.

Calif., Waterford—At a joint meeting of the Turlock and Modesto irrigation district directors, a resolution was passed to raise the La Grange dam to prevent the wastage of water. Following the close of the meeting the matter of electrical distribution was discussed but no action taken.

Calif., Santa Barbara—An irrigation dam, 50 ft. long, will be built across the Santa Ynez River, near Buellton, by the Diamond R. D. Rancho, E. E. Pudolph, president. Work will start before May 1.

Highways

Calif., Sacramento—R. M. Norton, state highway engineer, has been instructed by the highway commission to start preliminary surveys of the proposed Truckee River highway route from Truckee, Calif., to Verdi, Nev.

Calif., Santa Ana—Griffith Company, Los Angeles Railway Building, Los Angeles, was awarded contract by county supervisors at \$77,400 for paving 3.5 miles of county highway in Road District No. 17, near East Anaheim.

Calif., Oroville—The county board of supervisors has awarded contracts to T. H. and M. C. Polk of Chico for the construction of a unit of the Oroville-Chico highway between Wicks' Corner and the Neal Grade and for the construction of the Nelson road. Polk Brothers' bid on the former road, which is 9.35 miles, was \$72,006.80, and their bid on the Nelson road, which is 6.07 miles, was \$53,779.05. Five other road contracts are to be let during the next few weeks, and the end of the season will find the money for highways provided by the \$1,800,000 bond issue of 1919 practically exhausted.

Ore., Portland—Several awards of highway construction work were made at the recent meeting of the state highway commission, most important being that for the Tygh grade section of the Dalles-California highway in Wasco County, with 6 miles of grading. The successful bidder was the firm of Elliott, Scoggins & Paquet of Portland on a bid of \$194,050. Other awards were as follows: Keno-Klamath Falls section of Ashland-Klamath Falls highway, in Klamath County, 10.98 miles of grading and surfacing, awarded to Dunn & Baker of Klamath Falls, \$142,054.45. Unit No. 2, Crooked River, Deschutes County line, section of Prineville-Lakeview highway, in Crook County, 8.67 miles of grading, awarded to the Crook County court, \$76,619.50. Heppner-Jones hill section of Oregon-Washington highway, in Morrow County, 11.48 miles of broken stone surfacing, awarded to General Construction Company of Spokane, \$51,592. Port Orford-Sixes River section of Roosevelt coast highway, in Curry County, 3.30 miles of grading and surfacing, and 2.76 miles of surfacing, awarded to John Hakanson, Oakland, Ore., \$49,425. Holmes Gap-Rickreal section of west side highway, in Polk County, bridge, No. 87, over Basket slough, awarded to Oregon Contracting Company of Portland, \$5,372.50. Coquille-Fat Elk creek section of coast highway, in Coos County, 3.4 miles of grading, all bids rejected and work ordered readvertised for bids.

Ore., Cheshire—Eight miles of the old territorial road from Cheshire to the Benton County line will be macadamized by the county this year. Also the old territorial road from Crow to the north county line, 22 miles, is included in the county bonding act and \$176,000 was set aside to improve it.

Wash., Vancouver—The \$1,670,000 appropriated by the legislature for the completion of the remaining unfinished stretch of the Pacific highway between Kalama and Toledo will insure the completion of the road before Oct. 1, according to R. M. Gillis, district highway engineer for southwestern Washington. Bids on seven separate stretches of the unfinished 36.5 miles will be advertised for at once. Already 35,000 yards of sand and gravel have been

hauled and deposited in storage pits at seven points on the unfinished road.

Wash., Colfax—Whitman county commissioners have awarded to Campbell & Barr, Colfax, contract for constructing the Coulee-Hite road, 7 miles, on their bid of \$73,977.20. Road will be 16 ft. wide, with 8-in. macadam finish.

Wash., Pasco—Franklin county commissioners have awarded to G. I. Stickler of Lewiston, Idaho, contract for surfacing 10 miles of the Pasco-Kahlotus road, for \$26,345.50.

Wash., Davenport—Lincoln county commissioners recently voted to expend \$30,000 in constructing a road south of Davenport into Bluestem.

Wash., Olympia—The Washington state highway commission will receive bids until March 13 for two separate paving contracts on the Pacific highway in Cowlitz County. One unit will be 4.4 miles, between Kalama and Carrols, and the other 6.73 miles, between Carrols and Kelso. Concrete paving is specified for both units.

Irrigation Projects

Calif., Escondido—The Escondido Mutual Water Company has voted to issue 200,000 additional shares to raise \$150,000 for improvements to the company's irrigating system.

Calif., Fallbrook—The Huntington Land & Development Company will spend \$40,000 in improving the Honseratte Ranch which consists of 5,000 acres. Marsh land will be drained, and the tillable land put under irrigation. A reservoir will be built at the north end of the land, and the water pumped from the river.

Calif., Oroville—The contract for the lining of 13,100 ft. of the ditch of the Paradise irrigation district has been let to Wyatt Brown of Paradise. The work will be done by day labor. The Marysville Sand & Gravel Company was awarded the contract for the aggregate. The ditch is to be lined with 1½ in. of concrete reinforced with wire.

Mex., Hermosillo—The government of Sonora has three commissions at work on an immense irrigation project for that state. Preliminary work is being done for an irrigation plan to make available 1,500,000 acres, by a system of canals using the waters of the Sonora River. A commission is also at work in the state of San Luis Potosi on a dam at El Mezquite, costing \$3,000,000 and having a capacity to water nearly 3,000,000 acres. Information regarding these projects and others of the Mexican government can be obtained from Sr. Gustavo Couret, Mexican consul at Tucson, Ariz.

Ore., Bend—The Deschutes municipal improvement district, successor to the Tumalo irrigation district, recently voted a \$100,000 bond issue to aid in financing the large development now under way. The issue is in addition to \$550,000 previously voted, which is being used for the same purpose. The district also voted to apply for state guarantee of interest on the new issue. Jay H. Upton, counsel for the district, has been instructed to institute validation proceedings at once in the circuit court.

Wash., Tonasket—The bond issue of the Riverside district was carried, the issue being for \$450,000 for irrigation purposes, including the building of a dam near McLaughlin's Canyon.

Wash., Yakima—Construction work, amounting to \$250,000 for the purpose of irrigating 1,600 acres in the Grandeur district along Snipes Mountain, has begun and will be carried on through the winter. J. L. Lytel is the project manager.

Power Plant Equipment

Colo., Alamosa—Improvements to the local plant of the Colorado Power Company will be started shortly. A new 750-hp. turbo-generator will be required to replace the old time equipment now in use. Automatic stokers will be added to the boiler house, also a new condenser.

The engineering staff of the company at the head office in Denver is handling the matter.

Colo., Canon City—Improvements estimated at \$20,000 will be made to the boiler room of the local plant of the Southern Colorado Power Company, a Byllesby property with headquarters at Pueblo.

Colo., Denver—By order of the United States District Court, Ernest Stenger, receiver of the Denver Tramway Company, is authorized to purchase machinery and other equipment for the main power house, not to exceed \$215,000. It is understood that arrangements are being made to secure considerable of the equipment from the Bush River power station of the Edgewood, Md., arsenal, a project of the chemical warfare section of the government. Several generators are included in the list.

Idaho, Boise—Work has been commenced by the Idaho Power Company on the enlargement of its power plant on the east side of the Snake River at the American Falls.

Power Projects

Utah, Springville—The city of Springville has given approval of the petition to run a power line through her streets to carry power to the Columbia Steel site. The plan as at present outlined is to connect up with the 44,000-volt line of the Utah Power & Light Company here, which extends to Eureka and Sunnyside, and run the new line north along the state highway to the site. Estimated cost is approximately \$50,000. The Phoenix Construction Company has the contract for erection of the line.

Wash., Tacoma—The design and construction of the transmission line is taking precedence over all other factors in the Lake Cushman power development project, because it is planned to offer contractors electric power for use on construction work, from the city's present plant, transmitting the power in the opposite direction from that which will flow over the line when the new plant is completed. It has been determined that the power plant shall consist of four units, each having water turbine capacity of 32,000 hp., turning generators of 20,000-kw. normal capacity, capable of overload operation for short peak periods as high as 24,000 kw., or the total capacity of the water wheels. The immediate construction of two such units is proposed. The transmission line, 45 miles long, will include the proposed span across the Narrows, which, when completed, will be the longest electric transmission span in the world, it is claimed. The city council has approved a plan to issue the Lake Cushman bonds for development of the power site, in popular denominations and sell them direct to Tacoma residents. A new office for the engineering corps of the project has been opened in the city hall annex; Norton L. Taylor is head of the light department's engineering force, J. B. Gongwer, assistant.

Wash., Spokane—Building of a 60,000-volt power line from Pullman to Moscow, as an extension line from Lind to Pullman, was authorized by the Washington Water Power Company.

Wash., Vancouver—The Clarke County Light & Power Company, recently formed, has obtained an option on the springs in the hills near Battle Ground, and plans the installation of equipment to supply that town and the farmers in the community with light and water.

Wash., Seattle—Transmission wires for conveying the first electric power to be delivered in Seattle from the Skagit Project are being stretched and will be completed when the power is ready to be turned on in December, according to engineer in chief, Carl F. Udden. The transmission line will be 100 miles long, and the three wires to be used will have a capacity of 120,000 hp. When the timber crib dam at the Gorge unit is completed, which will turn water into one of the power tunnels, 50,000 hp. will

be delivered over the transmission line. The wires are to be strung on hanging insulators attached to a cross beam, two wooden upright poles being used for each unit. They are large enough to carry sufficient voltage "to light, heat and furnish power for more than one-half the entire Seattle district, which consumes about 200,000 hp." said Mr. Uhden.

Wash., Olympia—Thurston County commissioners recently granted a franchise for electric light and power line in the Pleasant Glade district to Charles G. Hawson and John Rogers, residents of the county. The proposed power line will serve the farming district in the vicinity of Pleasant Glade.

Wash., Wenatchee—The Washington Water Power Company of Spokane, it is reported, is planning the construction of 18 miles of power line between Ephrata and Quincy, providing electric power for domestic and irrigation uses.

Railways

Ariz., Glendale—A. T. & S. F. Ry. is planning to expend about \$60,000 in enlargements at the Glendale yards of the road. L. J. Prather, western manager of the Santa Fe refrigerator dispatch, Frank McGinnis, and John Moore, engineers, are in Glendale making preparations for the work.

Calif., San Francisco—Final passage of the bill authorizing the extension of the municipal railway from Sloat Boulevard to Farallones Street and Plymouth Ave. in the Ocean View district, at an approximate cost of \$265,000, has been recorded by the board of supervisors.

Calif., Los Angeles—Los Angeles Railway Company, Los Angeles Railway Building, has had plans prepared by its engineering department for a 2-story and basement brick office building to be erected at northeast corner of Sentous and Girard Streets for itself. It will be 50 x 125 ft., brick walls, steel sash, structural steel, composition roofing, metal skylights, lavatories, lockers, etc.; \$50,000.

Calif., Los Angeles—County supervisors have granted to City Railway Company of Los Angeles, a franchise for 40 years to maintain and operate a double track electric railway for transportation of passengers along Fourth Street, from west city limits to La Brea Ave.

Wash., Kelso—The Longview, Portland & Northern Railway Company has changed its plans for awarding contract for grading its line, on which bids were opened recently, for eight miles. The company will shortly receive bids for construction of the railway grade from the North Kelso city limits to the head of Arkansas Creek, a distance of about 25 miles.

Wash., Seattle—The utilities committee of the Seattle city council has invited Seattle car builders, who are interested in supplying the Municipal Railway with 200 street cars, to participate in a hearing to discuss the matter. The city council has passed an ordinance authorizing the board of public works to call for bids for the leasing of from 100 to 200 new cars, to weigh about half as much as the cars now in use. The cars are to be leased with the city having the option to purchase them for \$1,000 each at the end of 10 years; \$2,000 in seven years, and \$3,000 in five years.

Wash., Spokane—Completion of a block system between Spokane and Wenatchee at a cost of over \$400,000 and construction of a telephone line from Spokane to Seattle are among the improvements planned by the Great Northern Railroad for 1923, has been announced here by C. O. Jenks, vice-president. Oil burning locomotives will be installed on western divisions, he said, and orders have been placed for 1,500 box cars for delivery this year.

Wyo., Cheyenne—Two transportation lines which will have a direct bearing on the future of the oil industry in Wyoming have been practically decided on, one being the building of a railroad by the Haskell oil interests of Okla-

homa, from Casper to either Forsyth or Miles City, Mont., with the avowed purpose of supplying the Chicago, Milwaukee & St. Paul and Northern Pacific railroads with traffic in oil and coal from Wyoming fields, and the other is the laying of a pipe line by the Standard Oil Company to carry gasoline from Casper to Sioux City, Iowa. Incorporation papers for the railroad project were filed in this city Jan. 29. The plans are understood to include connection with the Burlington Railroad at Sheridan and the Union Pacific at Rawlins. Wyo. C. N. Haskell, former governor of Oklahoma, C. S. Lake, Peter Rohrbach, Jr., C. A. Eastman, and R. S. Healy, all of New York, are the directors and organizers.

Street Lighting

Calif., Redlands—Contracts have been let by the city trustees for ornamental street lights on three of the principal residence streets, to the Russell Electric Company of Redlands. The lights will cost in the neighborhood of \$30 a lot.

Wash., Chehalis—The city clerk announced that no bids were received on the installation of the ornamental lighting for Pacific Avenue and the commission voted to have the work done by the Astoria Electric Company.

Wash., Aberdeen—The city will shortly receive bids for extensive improvements to its lighting system in the downtown district of the city, including installation of additional posts and fixtures.

Streets and Sewers

Calif., San Diego—A \$325,000 bond issue for the installation of new water mains will be voted on at San Diego, at the primary election, March 20.

Calif., Manteca—Plans and specifications for a sewage disposal plant were adopted by the city trustees and forwarded to the state board of health for approval. The plans call for a multiple compartment septic tank, twenty-eight by sixty-three feet, and the estimated cost is about \$10,000.

Calif., Fresno—Operations at Pinedale, Fresno County's newest community, will be started, according to announcement made by officials of the Pinedale Realty Company. The first work to be done will be the paving of Minarets Avenue, which runs from the junction of Blackstone and Herndon Avenues to the mill. This avenue will be devoted to business buildings. A water system will be installed at once and the entire town will be completely piped. Cottages and business buildings are to be erected. Offices of the company are to be located in Fresno.

Ore., Portland—Extensions and construction of the north branch of the Rhine Street sewer are contemplated, the estimated cost of the improvement being \$180,574.

Ore., Portland—City money aggregating approximately \$3,000,000 will be expended during 1923 for the betterment of Portland's water supply, and for sewer and street improvements. Of this money \$1,000,000 will be used in laying the first unit of the third Bull Run conduit which will cost, completed, about \$2,000,000. Only the first unit will be constructed, although the contract for the work may be awarded in blanket form, the entire contract going to one construction firm. About \$1,600,000 will be expended by the public works department for sewer and street improvement. Lents trunk sewer costing well over \$600,000, and now well under way, will be completed and partly paid for from the 1923 appropriation.

Wash., Seattle—R. G. Stevenson on a bid of \$11,661, received the contract for installing water mains on East 70th Street, et al. Contract for similar improvement on 22nd Ave. N. E. was let to Paduano & Crissman, on their bid of \$10,581.

Wash., Seattle—A. Toemi, on his bid of \$18,493, was low for installation of sewers in

Eddy Street, and received the contract. City engineer's estimate was \$16,596.

Wash., Kelso—The United Contract Company of Portland, on a bid of \$20,344.10, received the contract for the street work in district No. 42, the low bid being 29c. under the next bidder.

Wash., Seattle—City Engineer J. D. Blackwell's plans for the grading of the north end of Beacon Hill, at an estimated cost of \$900,000, have been approved by the board of public works, and work on this project will proceed shortly. The project will be divided into four units, cost of which have not been estimated separately. One unit, the 12th Avenue South approach to Beacon Hill, is estimated to cost \$189,000.

Waterworks

Calif., Ventura—At a recent election a bond issue for \$250,000 to buy the Southern California Edison Company's water system here carried about 9 to 1.

Wash., Port Angeles—Department of public works at Olympia has ordered the North Pacific Public Service Company to make improvements to the company's water system in Port Angeles to cost between \$65,000 and \$70,000, and to include enlarging the distribution system; installation of settling basin; new standpipe of 50,000-gal. capacity, and metering the entire system. Company's petition for increased rates was denied, the Department reserving jurisdiction to reopen the case after the improvements have been made.

Miscellaneous

B. C., Vancouver—Harbor Improvements—On Feb. 13, the Dominion Parliament passed a resolution providing for a loan of \$5,000,000 to the Vancouver Harbor Commission for the development of Vancouver harbor. The bill was introduced by the Hon. Ernest Lapointe, Minister of Marine. Other works for the improvement of the harbor were being planned, the minister stated.

Calif., Hollywood—Architect Wm. F. Bowen, 813 Union League Building, has completed revised plans and is taking new bids for the erection of an ice storage building at Santa Monica Blvd. and LaBrea Ave., Hollywood, for the Home Ice Company. Steel construction, 40 x 78 ft., stucco exterior, 42 ft. high, maple and concrete floors, cork insulation, cooling tower, high pressure piping, elevator and conveyors. ornamental iron; \$50,000.

Calif., Los Angeles—Architects Jeffery & Schaeffer, 1106 Kerckhoff Building, have completed plans for a 2-story brick warehouse, 99 x 140 ft., to be erected at 2415 E. 14th St. for Imperial Warehouse Company. Work will be done by the day.

Calif., Los Angeles—Milwaukee Building Company, 315 Wright & Callender Building, is completing plans for a 2-story warehouse building to be erected at southeast corner of Santa Fe Avenue and Sacramento St. for Snorten & Curtiss. It will be 130 x 140 ft., brick walls, comp. roofing, metal skylights, steel sash, office partitions, elevator; \$90,000.

Ore., Astoria—Pier—A \$100,000 contract to build the proposed pier at the Tongue Point naval base has been awarded by the Federal Government to the Gilpin Construction Company of Portland and Astoria. The same concern was awarded a dredging contract for the removal of 400,000 cu. yd. at 15 cents a yard, or \$60,000, the improvements being in connection with the Tongue Point developments.

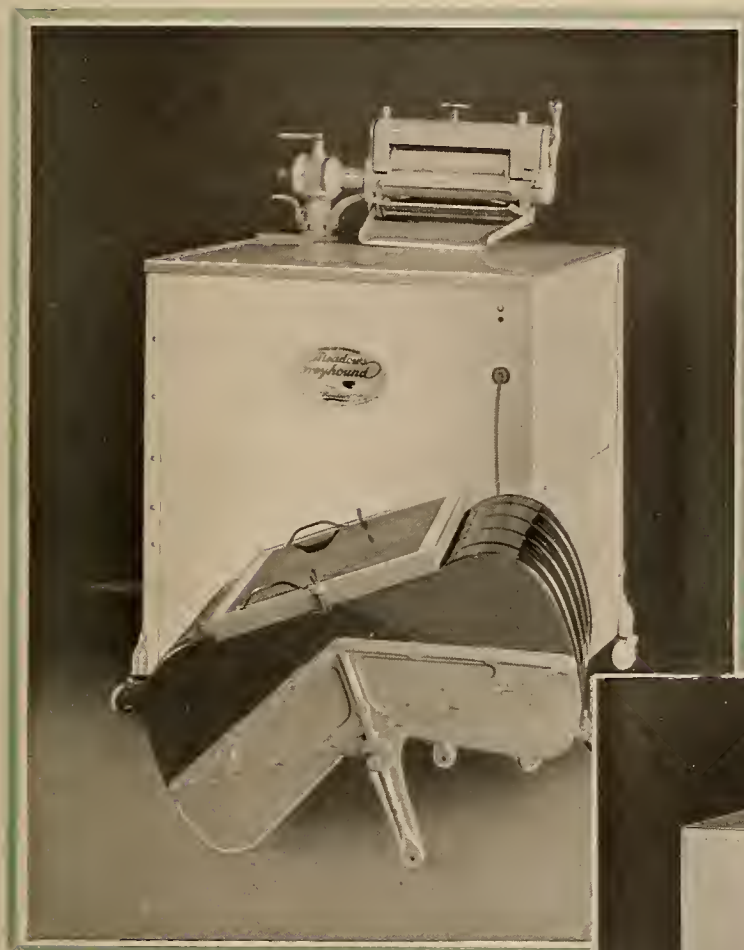
Wash., Aberdeen—Wharf—The Port Commissioners recently let contract to the Grays Harbor Construction Company for 300-ft. extension of the port wharf, on their bid of \$40,000.45; contract for second loading crane for the port was let to Colby Steel & Engineering Company on a bid of \$26,400.

Journal of Electricity and Western Industry

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March 15, 1923

San Francisco



The tremendous success which the new Meadows Greyhound—The Oscillator Plus—has met with on the Pacific Coast, as elsewhere, is directly attributable to its instant appeal to housewives. It follows the earlier and sustained popularity of its predecessor the Meadow Lark. The Meadows sales plan and discounts to central stations and dealers are impressive to aggressive merchandisers.

The Meadows Mfg. Company
Bloomington, Illinois



Above is shown the Meadows Greyhound—the Oscillator Plus. At the right is the Meadow Lark.

WESTERN DISTRIBUTORS

Manufacturers Representative Co., San Francisco, Los Angeles
Fobes Supply Co., Portland, Seattle.
Butte Electric Supply Co., Butte
Capital Electric Co., Salt Lake City
Mine and Smelter Supply Co., Denver

MEADOWS

Electric Washers

Underwriters Laboratory to Be Established on Pacific Coast

ELECTRICAL research and invention and the manufacture of electrical appliances, devices and materials in the region west of the Rocky Mountains will receive added stimulus from the establishment on the Pacific Coast of a branch laboratory of Underwriters' Laboratories, Inc., announcement of which is made on another page in this issue. At the present time this organization maintains but two other such laboratories, one in Chicago and one in New York, and it is planned to open a San Francisco branch co-important with the one in New York City.

Every new piece of electrical equipment, be it a snap switch or a generator, must receive the stamp of approval of the underwriters before it can be placed on the market or installed. Should it not receive this approval and should it not be included in the "List of Approved Devices" it is doomed to failure from a commercial standpoint. In the past every new device which was brought out by a western manufacturer or perfected by a western inventor has been sent to the Chicago laboratory for testing. Not only has the expense been considerable and the loss of time irksome, but necessary personal contact has been impossible. These obstacles will now be removed to the benefit of all concerned.

Testing and approving new devices is but one of the many services which the laboratory will offer. Considerable research will be undertaken and much valuable information will undoubtedly be uncovered. Thus should a manufacturer desire to know the best insulating material to use in connection with a new switch, he needs but turn to the laboratory and he will be furnished with an approved list showing the characteristics of each kind of material. Service of this sort is bound to prove immensely valuable.

Electrical manufacturers in the western states will welcome the announcement of the establishment of a branch of the Underwriters' Laboratories in the West.

Increasing Interest Being Shown in Ethics of the Engineering Profession

THE recent publication by the American Institute of Electrical Engineers of a new edition of the Code of Principles of Professional Conduct adopted by the Institute in 1912, brings to mind the decided trend toward the formulation and adoption of codes of ethics by numerous organizations in different fields of activity. Such codes have become important agencies in upholding high ideals in the constantly broadening social, economic, and industrial relations of the various groups concerned.

The engineering profession was slow to adopt such codes, because of the prevalence of the more general view that an adherence to the Golden Rule would meet all requirements without formulating specific applications to the engineering field. The broadening concept of the profession, due to its increasing contacts with the varied activities of life, gradually brought about a realization that a simple statement of desirable procedures in many of the

more common relations of groups and individuals within the profession, would be very helpful, particularly to the younger engineers.

These views led to the adoption of the Code by the A.I.E.E. in 1912. Ten years later, namely, in March, 1922, the Board of Directors of the Institute adopted resolutions reaffirming adherence to the 1912 Code, which "had served its purpose effectively during the past ten years."

Since the adoption of the Code by the Institute in 1912, several other engineering societies have also adopted codes of conduct, including the national societies of civil and mechanical engineers; and these other societies have also established committees or other agencies for the administration and enforcement of such codes.

An interesting feature which is clearly brought out by a comparison of the more recently adopted codes with the original, is that viewed all together they form strong endorsement of the principle of standardization. Some of these codes were prepared independently, purely in response to the demand for briefer and simpler statements of the leading principles; but after these had passed through the hands of the many who assisted with criticisms, and were brought out in their respective final forms, their resemblance to the Code of the Electrical Institute is striking. They not only cover practically the same subjects and are expressed in substantially the same language, but their authors have seen fit, after much consideration, to make their general structure, that is, the division of subjects and the arrangement, follow very closely the A.I.E.E. Code of 1912.

Proposed Engineering License Bill Is Live Issue in California

THE proposal to introduce in the California legislature a bill licensing engineers has aroused much interest and discussion among engineers in that state since its promulgation a few months ago. The consensus of opinion among those interested in a licensing law seems to be that such would be desirable both from the standpoint of public welfare and the benefit to the profession. Some engineers, while in favor of licensing or regulation, can not agree on the provisions, others are definitely opposed to legislation of this character.

The Public Affairs Committee of the California Division of the American Association of Engineers concludes a discussion of the proposed law as follows: "As the matter now stands the proposal of a specific license bill by the American Association of Engineers has indicated the general sentiment throughout the state as favorable and whether or not the movement is successful at this session of the legislature, the foundation has been broadened for final success in 1925. Disregarding the merits or demerits of licensing, the movement is growing and has acquired momentum throughout the United States. A majority of engineers favor it where its working is fully understood. There are now twenty-one states with license laws on the statute books, including both Oregon and Arizona. The force of circumstances may thus be

the most effective element to bring about the passage of the law in this state, for of those few California engineers who now strongly oppose it, many practice in adjoining states, and rather than submit to the inconvenience of qualifying under the laws of other states they will prefer coming under a license law in California containing a provision for reciprocity between states as does the proposed bill."

Licensing laws are being advocated in other western states at the present time. It is probable that agitation in favor of legislation of this type will increase as the years go on. Certainly it will prove an absorbing topic of discussion in the various western engineering groups.

Development of Colorado River Held Up by Arizona and Colorado

BY FAILURE to secure ratification by the legislatures of Arizona and Colorado, the Colorado River Treaty between the seven states tributary to that waterway, has been rejected. No permits for development of the Colorado will be issued by the Federal Power Commission until the pact has been approved, nor can Congress take any official action. The development of the Colorado River has been effectually and indefinitely arrested.

The Colorado River Treaty is a comprehensive workable plan for a systematic and far-reaching control of this great waterway. The treaty is at best a compromise, but all treaties are essentially compromises. Each of the contracting parties has made concessions. No arrangement can be made permanent if it is for the selfish interest of one side or the other. It is to be hoped that sufficient public interest will be aroused in the imperative need, that steps be immediately taken to harness the Colorado, that the recalcitrant legislators will be awakened to their selfishness.

Machinery Exports to Asia Increase Seven Fold in Past Five Years

DESPITE a strict curtailment in most lines since the war, exports of machinery to the far East have increased seven fold in five years, with every indication of continued rapid expansion. This somewhat startling report is revealed in an exhaustive summary of machinery markets in Asia recently issued by the Department of Commerce. Asia is rapidly developing in importance as a market for American machinery, having absorbed nearly \$242,000,000 worth of such equipment in the last four years; a quantity that would not have been absorbed in four decades at the pre-war rates.

Such a volume of modern factory, mining, railway and construction equipment in the hands of the teeming populations of Asia releases forces that are difficult to appreciate but which will undoubtedly seriously affect the history of the world during the next few decades. Furthermore, a movement of this character once started carries itself forward of its own momentum. Japan has shown us what is to be expected under such circumstances. At the present

time when looking abroad the eyes of our people almost always turn toward Europe; they should be warned to watch Asia.

The importance of export trade to the average Pacific Coast manufacturer is increasing very rapidly. It was not many years ago that the domestic market absorbed easily almost all the domestic production, and the rapid development of the home territory provided a satisfactory increase in the domestic demand. This situation is changing, and year by year it is becoming more necessary to cultivate outside markets if business is to show a satisfactory expansion.

On the whole, it appears that American manufacturers can expect to export to Asia during the next few years an average of \$40,000,000 to \$50,000,000 worth of industrial machinery, and foreign sales managers will presumably be justified in developing their organizations to correspond to this basis. With the exception of Great Britain, there is no country other than the United States which exports anything like the amount of machinery indicated by the foregoing figures, and it does not seem probable that foreign competition will disturb the trade to any serious degree.

Washington Utilities Face State Ownership Problem

AS A result of a bitter political fight in the state legislature in Washington relative to the taxing of municipally owned power plants and the sale of power by municipalities outside of city limits, a state ownership bill seems imminent at the next election. Both the power companies and the municipal officials who have been contending over the extension of municipal power lines will undoubtedly oppose a state ownership proposal, should such be advanced. It is regrettable that the logical and orderly development of the hydroelectric resources of the western states cannot proceed without the constant hampering of political interference.

Hydroelectric Development Presages Continued Prosperity in West

EVIDENCE that the rapid and unimpeded development of the hydroelectric resources of the West is proceeding upon schedule is apparent in important announcements appearing elsewhere in this issue. Work is already under way to add the third unit of 22,000-kw. capacity to the Caribou plant of the Great Western Power Company. Bids have been called for by the city of Seattle for the construction of 100 miles of 165,000-v. transmission from the Gorge Creek plant on the Skagit River to Seattle, and the Pacific Gas & Electric Company has announced that work will begin within the month to develop an additional 100,000 hp. on the Pit River, by the construction of Pit No. 3 plant.

Translated into dollars of industrial development this means a continually expanding market for all classes of electrical apparatus, appliances and supplies.

CURRENT COMMENT



Seasonal decreases in the use of electric power for industrial purposes were smaller than usual for December, 1922, in the Twelfth Federal Reserve District and the total sales of 20

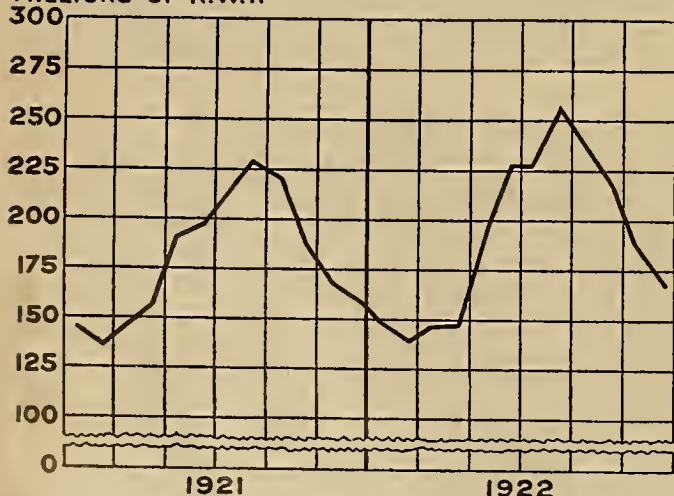
Power Demand in West Is Increasing

of the principal companies in the district were 20.6 per cent greater than during December, 1921, according to the current report of the Federal Reserve Agent. An increased demand for electric power compared with a year ago was reported for all of the major industries of the district except agriculture. The abundant rains of the present winter are credited with being largely responsible for the decline in agricultural consumption of electric energy. Sales of power for industrial purposes by certain industries and by sections of the Twelfth District are compared in the following percentage table:

| | Agriculture | Mining | Manufacturing | Total Industrial Sales |
|-------------------------|-------------|--------|---------------|------------------------|
| California | -43.2 | -1.9 | +32.8 | + 8.7 |
| Pacific Northwest | +28.0 | +12.8 | +19.5 | +27.9 |
| Intermountain | -21.9 | +58.0 | +40.6 | +83.5 |
| Twelfth District | -42.3 | + 6.8 | +29.6 | +20.6 |

Compared with November, 1922, total industrial sales of power during December were less by 5.1 per cent. There were seasonal declines in the de-

MILLIONS OF K.W.H



Total industrial sales in kw-hr. for eight California power companies for 1921-22 as reported to the Twelfth District Federal Reserve Bank.

mand of the agricultural, lumbering and manufacturing industries. In the accompanying chart are shown the total industrial sales of eight California power companies during 1921 and 1922, as reported to the Federal Reserve Bank.

Figures showing the number of industrial consumers and industrial sales during December, 1921, and December, 1922, follow:

| | Industrial Consumers | | Industrial Sales, Kw-hr. | |
|----------------------------|----------------------|------------|--------------------------|-------------|
| | Dec., 1922 | Dec., 1921 | Dec., 1922 | Dec., 1921 |
| California | 58,100 | 48,046 | 174,281,634 | 160,212,857 |
| Pacific Northwest | 11,029 | 10,266 | 77,898,863 | 60,903,336 |
| Intermountain States | 10,036 | 9,743 | 42,532,384 | 23,166,257 |
| Twelfth District | 79,165 | 68,055 | 294,712,881 | 244,282,450 |

It is upon a growth such as that indicated in the above table that the western utility companies are basing their development programs which call for an addition to the generating capacity of approximately 10 per cent each year.

The use of artificial light—in this case, electricity—in poultry houses in the rural districts to increase winter egg production has become so important in

Poultry Industry Offers Use for Electric Light

California and other sections of the West that a series of exhaustive tests have been conducted at the University of California Agricultural Experiment Station at Davis, Calif. The tests have been made the subject of a bulletin which has just been issued by the College of Agriculture of that institution. So important is the poultry industry in certain sections of California that considerable load can be built up by central stations and profitable business secured by the contractor who makes a specialty of catering to the poultryman. The results of the tests made by the University of California should provide strong arguments both for the contractor and lighting salesman.

The use of artificial lighting in poultry houses was first employed on the assumption that fowls do not require more hours of rest in winter than in summer and that if artificial lighting were used in winter to produce similar conditions of daylight and darkness as exist in spring and summer, increased production ought to result. Investigations conducted at the station proved that winter egg production can be increased as high as fifty to sixty per cent by artificial lighting. The fact that eggs are higher in price during the winter months and that added production at that time means increased monetary return is further argument for the installation of lights.

Tests have shown that one 25-watt lamp equipped with a good metal reflector is sufficient to

properly light 60 sq. ft. of floor space. Lights should be hung 6½ ft. from the floor.

In California the use of artificial light should be begun in October and discontinued in March. It has been found best to use the artificial light in the mornings, turning the lights on at a time which will provide a 14-hr. working day for the hens. Use of morning lighting alone does away with the necessity of dimming which must be done at night to imitate the approach of darkness.

Electrical manufacturers have already begun to realize the importance of this new application of electricity and recently there has been placed on the market a simple and cheap time switch for turning on the lights at an early morning hour. The circular issued by the University of California contains a working drawing of a simple switch which may be made up in the shop at a slight cost.

It is certain that there are many arguments in favor of this type of load. It is one that can be seriously considered by both central station and contractor.

While no statistics exist upon which to base the actual possibilities for modern electrical cooking and heating equipment abroad, conditions in certain foreign countries appear to be favorable enough to warrant more aggressive action on the part of manufacturers of commercial baking ovens and of heating equipment for industrial purposes, according to reports from the Department of Commerce. In many countries, which are dependent upon foreign coal and oil supplies, the cost of fuel is high and there has been limited development of artificial-gas systems, which would normally cater to that class of load.

Opportunity for Electric Heat in Foreign Markets

In certain of these countries, such as Switzerland, Norway, Sweden, Spain, Italy, and Brazil, where coal is expensive, the water-power resources are abundant and the extensive development of these resources has resulted in a low cost of electric service, which makes the use of electric cooking and of industrial heating economically feasible.

In many of these countries it is believed that baking ovens of the revolving type can be introduced into many of the better-class bakeries, if aggressive selling methods are adopted. Standards of sanitation are rising the world over and this fact, coupled with favorable prices for electric energy and the very unique advertising value of modern revolving electric ovens, especially if installed so as to be accessible to the public, should open a broadening field for such equipment. Along with the electric oven of this type other electrically driven equipment, specially developed for baking establishments in recent years, should find an increasing sale.

Heating equipment installed for special industrial processes has apparently had little attention in foreign countries, but the recognized efficiency of such installations should result in their being adopted in many industrial operations abroad if properly presented.

Some time ago tea planters in Ceylon expressed interest in the application of electric heat to the curing of tea leaves—an idea which is typical of the many possible developments for electric heating awaiting solution by our manufacturers who specialize in industrial heating equipment. Likewise, the application of electric heating for baking the enameled finish of manufactured articles, as developed to a considerable extent in the automobile industry, should find a promising field in manufacturing countries where electric power is available at a reasonable price per kilowatt-hour.

Manufacturers, however, must bear in mind the fact that the economics of electric ovens and the application of electricity to industrial use are none too well appreciated by business men, even in this country, and are still less known abroad. For that reason it will be necessary to make aggressive efforts to develop business in foreign markets and manufacturers must have representatives who have a thorough knowledge of the technical and commercial features of the products they are to sell, combined with a full knowledge of the processes to which they propose to apply the new equipment. Conditions, however, are favorable, and if the right kind of agents are secured, there is no doubt that a fair amount of business can be built up.

For the sixth time since May, 1922, the average daily production of electricity by public utility power plants has broken all records, according to figures compiled by the United States Geological Survey showing that December production is slightly in excess of that for any month in the history of the utilities. The increase, however, over the revised figures for November, 1922, was small, showing that the seasonal decrease which usually occurs around the first of the year apparently started in December. The average daily output for December was 147,600,000 kw-hr., while that for November was 147,000,000 kw-hr. The month-by-month output for the year follows:

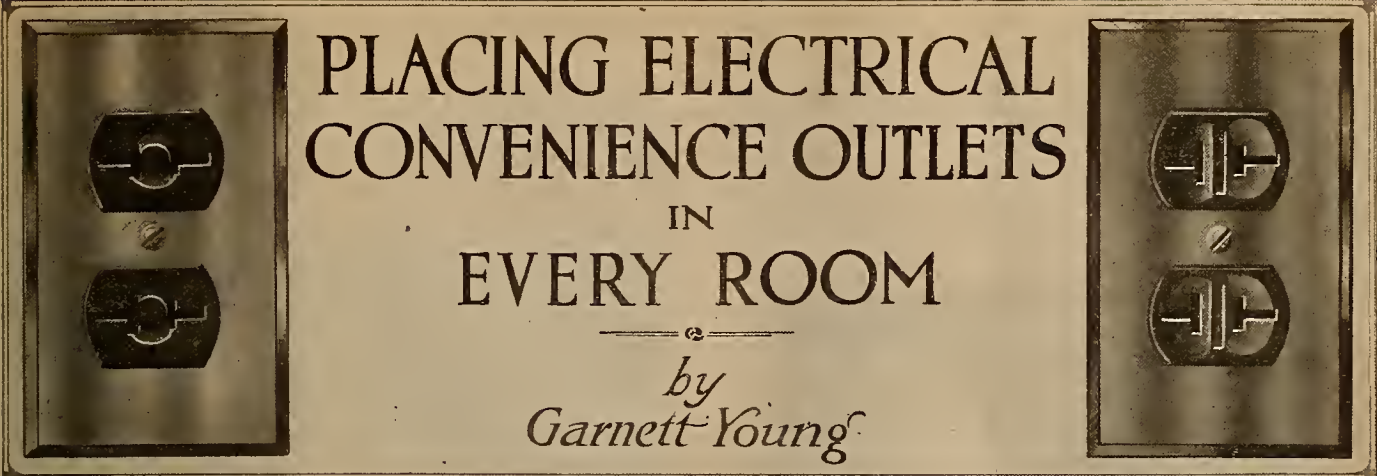
Daily Production of Electricity Breaks Records

| Month— | Kw-hr. |
|-----------------|-------------|
| January | 122,900,000 |
| February | 123,900,000 |
| March | 123,300,000 |
| April | 120,000,000 |
| May | 123,400,000 |
| June | 127,900,000 |
| July | 124,900,000 |
| August | 131,400,000 |
| September | 135,000,000 |
| October | 139,800,000 |
| November | 147,000,000 |
| December | 147,600,000 |

The average daily production for the year was 130,600,000 kw-hr. The increase which has occurred during the past year can be taken as indicative both of the general resumption of industrial activity and the increasing use of electricity for power purposes.

THE interior of an open hearth steel furnace (center) seen through the colored glasses of the operators of the San Francisco plant of the Pacific Coast Steel Company. From this molten metal, which is heated to 3200 degrees Fahr., the galvanized steel transmission towers, shown in the inset, are made.





PLACING ELECTRICAL CONVENIENCE OUTLETS IN EVERY ROOM

by
Garnett Young

IN THE fall of 1919, a paper was prepared by a subcommittee and later adopted and presented by the Commercial Committee of the National Electric Light Association, Pacific Section, which brought up for cooperative handling, by the united industry in California, the subject of complete wiring of the home. This paper, the title of which was, "How the Electrical Industry Should Cooperate with the Architect and Home Builder," made it perfectly clear that the future development of the domestic application of electricity rests chiefly upon a single contingent factor of economic bearing, that is, convenient service to the consumer. It was further decided that this desired element of convenience could be attained only through educating the public to an acquaintance with and liberal use of the flush receptacle as an outstanding feature of household wiring installations.

It was demonstrated that the responsibility for inadequate home wiring could not be laid to the architect and builder, but to the electrical industry itself, guilty of unsound sales propaganda, and that, in seeking a remedy, it was up to the industry to undo its own mischief and set the public straight. In such an educational task the major efforts had to be aimed directly to the people but, of course, supplemented by such assistance as might be obtained from architects, builders and other mediums. With these conclusions accepted as a foundation premise, the paper proceeded with specific suggestions as to methods of attacking the problem, which was, after all, to sell the electrical idea to the public. The recommendations made, in-

cluding the specific recommendation that the California Electrical Cooperative Campaign be charged with carrying out the educational program, and to that end, be equipped with funds and additional facilities to make this possible, were endorsed by the

Executive Committee of the Pacific Section. Thus, action was gotten under way several months in advance of the ultimate appearance of the paper on the convention floor in Pasadena on May 19, 1920.

The Cooperative Campaign accepted the responsibility and started to work early in 1920, inviting to its meetings a number of individuals particularly interested. "An Outlet for Every Appliance" was the slogan adopted within the industry as most fittingly measuring the ambition of the movement. The movement itself was deemed to have uncovered a vital fundamental, namely, that the flush receptacle, in both the physical and commercial sense, is virtually the "neck of the bottle," through which must flow the current that provides home

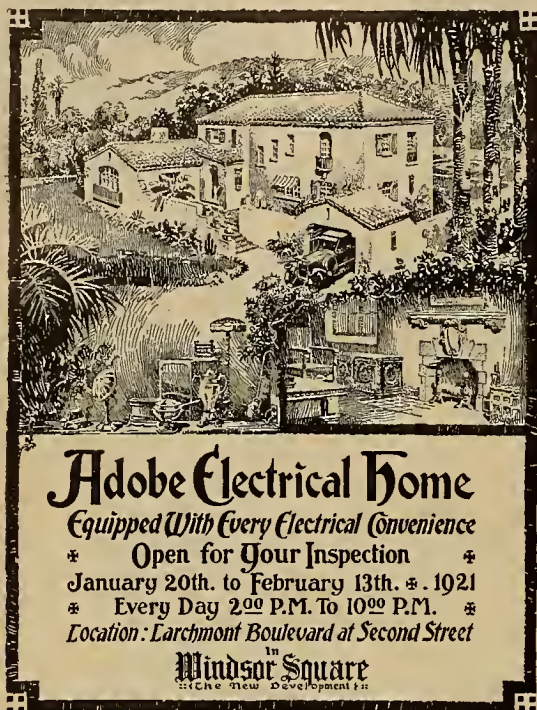
THE California Electrical Cooperative Campaign has received national recognition for its activities in establishing the term "Convenience Outlet." The educational program it has followed since 1920 in bringing before the industry recognition of the fundamental importance of increasing the number of electrical outlets per home is current history. The electrical industry now realizes that its prosperity is predicated upon the domestic use of electricity, and the Campaign can take due credit for its share in bringing this about. But the obvious is apt to be overlooked. The accompanying survey of the "Convenience Outlet" Campaign will prove interesting reading to every member of the electrical industry in the West. In the three short years it has been under way the number of outlets installed in the new homes in California has increased from one per home to one per room!

service, while, at the same time constituting the connecting link between electricity and the billions of dollars of trade for manufacturer, jobber and retailer that follows in the wake of its domestic adaptation. "Convenience Outlet," possibly not a new term, was selected as the best and most appealing designation under which to put forward the flush receptacle to the public and, ever since, the home wiring drive has been known as the "Convenience Outlet" Campaign, with various forms of publicity playing up that phrase.

Among the first steps taken was the publication

of the Commercial Committee paper in the Journal of Electricity and The Architect and Engineer, with suitable illustrations and wiring diagrams, reprints being distributed to all architects, builders, contractor-dealers, jobbers, manufacturers, etc., in California.

Beginning in January, 1920, a special representative was employed to interview and interest architects and builders. It was not long before this



Illustrations such as this appeared in the book prepared by the California Electrical Cooperative Campaign to permit other sections to benefit from the experiences of the Los Angeles Electric Home.

representative found it necessary to extend his sphere to cover the realty people, engaged in subdividing tracts for new residences. He then undertook the task of selling the electrical idea to all of these allies in home construction.

Contact with a group of subdividers led to the happy inspiration of the "Modern Electrical Home," a rather expensive innovation, but easily justified by the potential possibilities for direct and effective publicity. This experiment was first tried out in San Francisco with such signal success as to induce repetition in Oakland, Sacramento and Los Angeles, two homes having been displayed in the last named city. These homes were inspected by approximately 136,000 visitors and it cannot be doubted that substantial numbers of them were interested and not merely curious. Demonstrators in charge of the homes supplied all visitors with copies of the attractive pamphlets and wiring diagrams, telling the story of Electrical Home service. The same demonstrators talking with the guests placed emphasis on the "Convenience Outlet" as the means to the accomplishment.

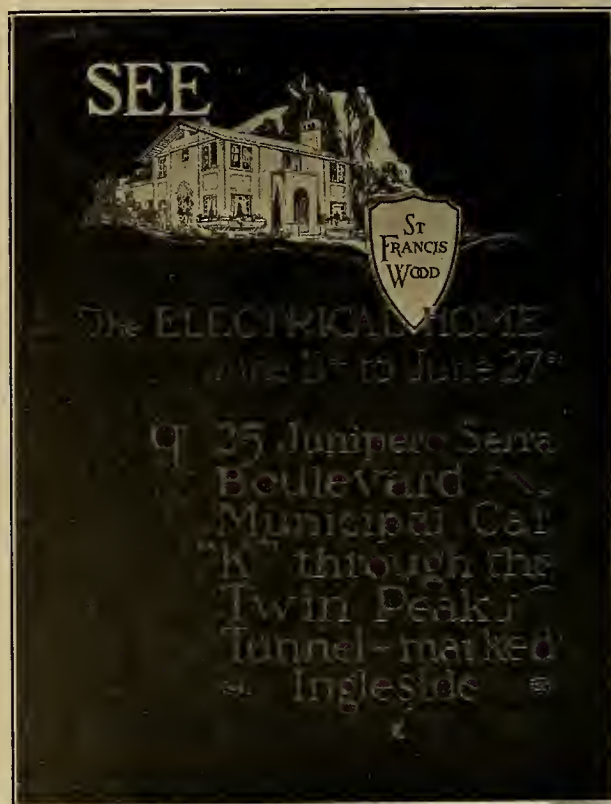
In smaller towns, where "Electrical Homes" were not practical, the Campaign promoted the idea through exhibits at county fairs. This was done by

means of dealers cooperating in providing electrical exhibits for these occasions.

During the year 1920, supplementary distribution was made of approximately 2,500 each of two different booklets secured from the National Electric Light Association, eastern headquarters, these booklets illustrating and describing the arrangement of a modern electrified home. Also during the year, 10,000 copies of the original small size wiring plans were distributed, in addition to repeated publications of it in various newspapers in connection with the combinational electrical pages then in vogue. Toward the close of the year, the modified and improved home-wiring plan was gotten out and 50,000 copies printed. Enlarged prints were made and sold for display purposes.

In May, 1920, a paper entitled "Possibilities of the Convenience Outlet Campaign" was presented to the annual convention of the National Electrical Supply Jobbers' Association at Del Monte, Calif.

Activities for the year 1921 were opened up with the advent of the second "Electrical Home" in Los Angeles, this being the famous adobe home, the most pretentious and successful of all the homes



To attract the people of San Francisco to the first "Electrical Home" displayed there, the Campaign prepared a brightly colored card which was displayed in the windows of all the local electrical dealers.

exhibited. It remained open for 25 days and was inspected by 57,000 visitors.

The unprecedented success of this adobe home exhibit, and the wide publicity incident thereto, brought requests for information for particulars from all parts of the country. The Campaign concluded to prepare a history of the electrical home movement to serve as a guide for future activities

of this kind, not only in California but elsewhere. This book was fully illustrated and 300 copies of it were sold.

To further capitalize on the adobe home, a motion picture was made of it, and two copies of this film were sent over the picture circuits of California, showing to 184,000 people. A slide showing



The Oakland Electric Club in cooperation with the Campaign staff exhibited this "Electrical Home" which was an eight-room structure having thirty-eight "Convenience Outlets."

a "Convenience Outlet" in use was later shown to audiences, totaling 318,000.

A still further effort to attain saturation with publicity on the "Electrical Home," and especially in the rural districts, was a series of eight illustrated stories run in 41 newspapers of the state, with a circulation of 323,000. The amount of newspaper space represented in this publicity was 10,480 in.

An appeal, over the signature of the Advisory Committee of the Campaign, was made to manufacturers and other national advertisers connected with the electrical industry, to include in all of their copy small cuts of the "Convenience Outlet" associated with some suitable clause as, "Wire the Home Complete for the Convenient Use of Electrical Labor-Saving Appliances."

A Plan to Interest the Contractor-Dealers

In order to tie-in the contractor and dealer with the drive on "Convenience Outlets," a Campaign member appeared before the Oakland meeting of the California State Association of Contractors and Dealers and made a talk to put over the self-interest factor, proving to these salesmen of the industry that their best interests were parallel to the advancement of the "Convenience Outlet."

At the Los Angeles Industrial and Trade Exposition, the Campaign arranged an electrical exhibit, demonstrating clearly the uses of "Convenience Outlets" for utility appliances. This affair was attended by 302,000 visitors and an extensive distribution was made of the booklet, "Comforts and Conveniences of Electricity in the Home."

The Campaign had printed a quantity of placards, which were easily readable from the street, these to be placed upon properly wired homes. This

notice read, "This Home is Wired Throughout with Electrical Convenience Outlets."

In September was held the first of a series of "Architects, Builders and Realtors' Days," using the electric clubs as a medium. This first meeting was before the Oakland Electric Club, the attendance being 140, of which half the number were visiting architects, builders and subdividers. A Campaign member made a talk on proper wiring of homes, emphasizing the convenience outlet as the pivot of this accomplishment. Similar meetings supplemented by playlets were held by the Los Angeles and San Diego Electric Clubs.

In October, 1921, a Campaign member made a trip East and was delegated to call upon the leading wiring device manufacturers and urge them to adopt the term "Convenience Outlet" (in place of the old designation—flush receptacle) in all of their advertising, carton labels, shipping marks, catalogs, etc. This appeal was successfully made with the desired results coming into effect a few months later.



Homes under construction in which one or more "Convenience Outlets" were installed in each room, were supplied with cards stating, "This house equipped with 'Electrical Convenience Outlets.'" Home buyers began to look for these placards.

Cooperation was also secured from national electrical societies and publications.

During November there was held in San Francisco a California Industries Exposition, and the Campaign saw to it that the domestic science exhibit of the San Francisco Public Schools included a complete electrical kitchen featuring "Convenience Outlets." This exposition was attended by many thousands of visitors.

During December, 25,000 copies were made of a new and much improved wiring plan on which the Campaign had been working for several months. The plan was in the form of a four-page folder, part of which was devoted to interior views of different rooms with the walls cut away, revealing all of the furniture and electrical equipment in place to conform to the wiring provided in the accompanying diagram. Distribution was immediately started to all architects, builders and subdividers, electrical contractors and dealers throughout California, and a supplementary supply was sent out to the sales organizations of electrical jobbers and manufacturers, as well as the district offices of power companies. A series of bulletins and window cards were also printed. One thousand additional quarter cards for placarding properly wired homes were printed in order to continue the practice described, this having been found a very effective means of forcing the hands of builders and subdividers on the installation of "Convenience Outlets."

The New Wiring Plan of the Campaign

During December an essay contest was conducted by the San Francisco Bulletin and the Los Angeles Evening Express on the subject, "Why Is Electricity the Modern Servant in the American Home?" Some 1,700 essays were submitted as a result of the almost continuous publicity given to the contests by these two papers. Prizes were awarded in the nature of electrical equipment for the home. The last activity of the year was a meeting of united sales organizations called by a Campaign member to increase the self-interest of electrical salesmen in the "Convenience Outlet" drive.

Throughout the year 1921, the Campaign field men continued the practice, begun in 1920, of calling on architects, builders, realtors, owners, subdividers, etc., in support of proper home wiring based on the "Convenience Outlet." This was a daily procedure and results were made apparent through the improvement of electrical specifications coming from

architects' offices and through the decided increase in the number of "Convenience Outlets" installed. Surveys made in various tracts at the close of the year reveal an average of six convenience outlets per home. On other surveys made among apartment houses, almost all of them had at least one "Convenience Outlet" in each room, while many of them had two. Surveys made among new office buildings and hotels gave the same results as apartment houses.

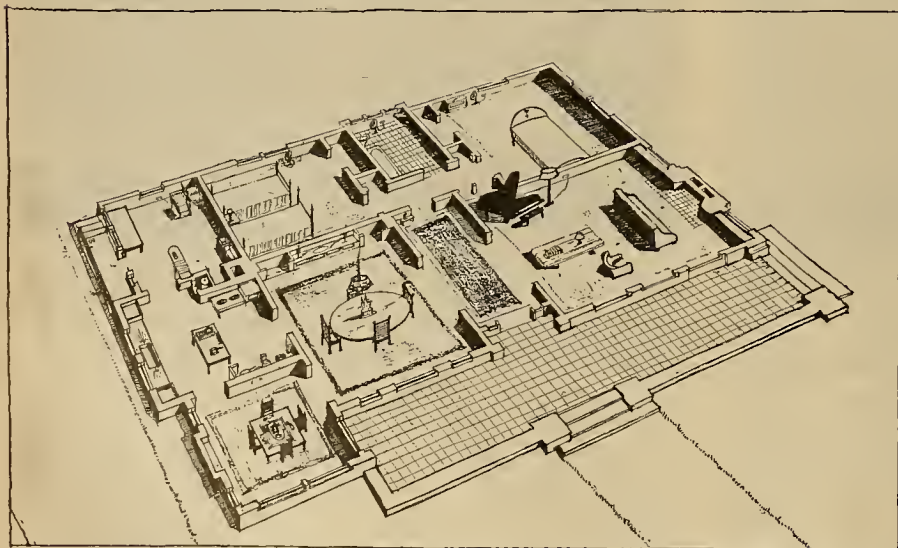
The year 1922 was started off with a follow-up to the meeting of united sales organizations. This follow-up consisted of a written appeal to the sales managers of manufacturing, jobbing and power companies to encourage their salesmen to lend a hand in their daily contact with electrical contractors and home builders in promoting the "Convenience Outlet" idea. The state associations of contractors and dealers were also urged to support the drive.

In Opposition to Open Contact Receptacles

The Campaign staff was put to work in earnest opposing flush receptacles with open contacts or lacking the interchangeable feature of the standardized type. This fight was carried to the departments of electricity of the leading cities in the state and considerable encouragement received.

The Campaign arranged a suitable electrical exhibit in the "Architects and Builders Exposition" held at Stockton during January, this exhibit providing a demonstration of "Convenience Outlets," electrical appliances and ranges, etc.

In February the Campaign ordered 1,000 "Convenience Outlet" counter cards, these cards being an exact reproduction in actual size of the standardized type of "Convenience Outlet" and plate. The cards were lithographed and embossed, while the T-slots were punched through the cards, thus making it possible to insert a plug cap. Arrangements were made for distribution of this counter card to all architects and builders, while one was placed upon the counter of every contractor and dealer and in all district sales offices of the power companies.



The Campaign issued a four-page booklet and on one of the pages this drawing of a cut-in section of a modern home was displayed, showing a practical electrical installation. The furnishings showed how the home would look occupied.

Electric "convenience outlets" in all rooms add to your pleasure from your electrical appliances. Speak to your dealer about them.



One electrical manufacturer distributed this placard to aid in establishing the new designation "Convenience Outlet."

During this month the Campaign arranged for the proper wiring and electrification of the prize bungalow of the San Francisco Chronicle, donated to the winner of the new subscribers' contest. For a period of two months prior to the close of this contest, this model bungalow and the electrical features received almost continuous publicity in the columns of the newspaper.

In March the Architects, Builders and Realtors' Days were resumed with a huge meeting through the medium of the San Francisco Electrical Development League, the attendance reaching 406 and including 170 architects, builders and subdividers invited for the occasion. A few days later the San Diego Club arranged a similar meeting.

the happiness and comforts to be derived from the truly electrical home and how this could only be brought about through proper wiring with a liberal use of "Convenience Outlets."

During July, a Campaign member appeared before the new business superintendents of the Pacific Gas & Electric Company and delivered a short talk in an attempt to prove the value of the "Convenience Outlet" as a revenue producer for the power companies. During the month the entire industry in the state was notified that standardized "Convenience Outlets" were available and the men in the business were urged to use the name at all times.

Later in the month a survey was taken among members of the San Francisco Electrical Develop-



The window display of the H. L. Miller Company of Pasadena, Calif., won first prize in the contest held by the California Electrical Cooperative Campaign in conjunction with the June Bride Week held June 5-10, 1922.

In April, a Campaign member appeared before the Retail Salesmen's School, conducted under the auspices of the Educational Committee of the Campaign, and rendered a brief history of the development and progress of the "Convenience Outlet" idea, emphasizing the practical value of this movement of the dealers and, by means of samples at hand, demonstrated the contrast between the standardized "Convenience Outlet" and its long list of predecessors.

On May 1, the city of Los Angeles put into effect its ruling prohibiting the use of any flush receptacle lacking the feature of concealed contacts, while bolding demanding the exclusive use of "Convenience Outlets" with concealed contacts, and making detailed provisions for special "Convenience Outlet" circuits in homes and stores.

"June Bride Week" was the next event on the calendar, this involving many different statewide efforts to focus the attention of the public upon electrical appliances for the home and proper wiring to serve them. One feature was a message broadcasted over the radio by President Browne of the State Contractor-Dealers' Association, explaining

ment League with the object of developing the relationship of the "Convenience Outlet" to the use of electrical appliances in the homes of those reporting. The results of this survey revealed that "Convenience Outlets" and electrical appliances were consistent running mates.

During this month a written appeal was made to the Associated Manufacturers of Electrical Supplies to see to it that their member manufacturers gave proper recognition to the "Convenience Outlet" in their national advertising. This appeal from the Campaign was supplemented by an appeal of individual local members of this institution and also by an appeal from the contractor-dealers' association of California.

In August, the cities of San Francisco and Oakland, followed the lead of Los Angeles, in that the department of electricity of each place put into effect a ruling forbidding the use of flush receptacles which lacked the concealed contact feature. These rules require the use of "Convenience Outlets" with concealed contacts.

At this time, the Pacific Gas & Electric Company, cooperating with the home wiring drive, ran

"Convenience Outlet" advertisements in 280 newspapers of the northern part of California. Concurrently, the Southern California Edison Company ran similar advertisements in 141 newspapers of the southern part of the state.

During August the Campaign got under way a drive, which extended through September, in which 80 men were pledged by San Francisco and Oakland manufacturers, jobbers and power companies to make a total of 240 calls on residential tracts for the purpose of selling the "Convenience Outlet" idea to the tract salesman. This was to be done incognito, the representatives appearing in the role of prospective home buyers and, in the language of the layman, demanding sufficient electrical outlets.

The Los Angeles Industrial Exposition, running from Aug. 25 to Sept. 9, carried an electrical section and "Convenience Outlets" were featured in almost all of the individual electrical exhibits which made up the section. They were also installed freely in a model kitchen and breakfast room in the building material section. This model kitchen was visited by almost 100,000 people.

The Campaign worked with the "Complete Homes Exposition" staged in the Lakeshore Highlands district, Oakland, from Sept. 28 to Oct. 16. One of the ten homes exhibited was known as "The Electrical Home," the wiring of which was supervised by the local Campaign staff and includes a total of 71 outlets, of which 21 are "Convenience Outlets" for appliances and five "Convenience Outlets" for heating equipment, one outlet for a water heater and one for an electric range. The balance of the outlets are for lights and switches. The special advertising of this electrical home was in the name of the Oakland Electric Club. This electrical home secured a great amount of publicity for proper home wiring

and, particularly, convenience outlets. The California Industries Exposition was presented in San Francisco in October and the local Campaign staff aided electrical exhibitors in featuring convenience outlets in their respective displays.

Representatives of the Campaign continued the work of advising architects, builders and realtors throughout the year and during the year 20,000 copies of the wiring plan devised by the Campaign, were distributed. Usually the plan was accompanied by a copy of "Electrical Specifications for Residence Wiring." This contained all necessary data for the complete wiring system in the modern home. As a result of the personal calls of the Campaign representatives, frequent telephone calls from architects for assistance with wiring plans were received during the year. An average of one call a week was received from architects for this assistance. In each instance when plans were delivered and fully explained, assurance was given that the wiring would be done accordingly.

During 1922, the Campaign staff maintained a perpetual running survey among new tracts and the data secured shows that the direct results accruing from the activities of the staff are not theoretical, but practical and concrete. A survey made by the Campaign brings out the fact that in 933 homes inspected in various parts of California, there were 5,071 rooms, and the total number of lighting outlets was 19,494. These houses contained 10,224 switch outlets and 5,961 "Convenience Outlets." These figures show an average of 6.4 "Convenience Outlets" per home and an average of 1.2 "Convenience Outlets" per room. The results from the work are very satisfactory, for two and one-half to three years ago the average new home contained but one "Convenience Outlet."

Albuquerque Electric Company Serves Rapidly Growing Territory

TO ONE who travels from Denver, Colo., to El Paso, Tex., Albuquerque, N. M., leaves the impression of an oasis on the arid plains of New Mexico, thriving and bustling with agriculture and industry, and to the easterner who journeys to the West, via the California Limited on the Santa Fe, Albuquerque conveys the first vivid impression of western civilization. Quite unlike its neighboring city, Santa Fe, with its quaint adobe buildings and narrow streets and its historical setting, Albuquerque is a modern western city with wide streets lined with shade trees and many beautiful residences and business buildings. The traveler who alights from the train, is impressed by the extensive and elaborate Indian curio store conducted at the station, and by the many Indian squaws who are seated on the platform ready to sell their wares to any who will buy.

This rapidly growing territory, with a population of about 30,000, is served by the Albuquerque

Gas & Electric Company. Characteristic of power companies of the West, the company is enjoying a steady and normal increase in business, 4,800 electric consumers in the city and surrounding territory now being supplied by it. During the past seven years the load on the system and the number of customers has more than doubled, and during the last two years 1,300 new consumers have been secured by the company. Based on the new business obtained during January of this year, the number of electric consumers will be increased by more than 1,000 during 1923. To meet the increasing demand for lighting and power service, the company has just completed the installation of a 2,500-kva. turbo-generator at a cost of approximately \$100,000. In addition to this, a like amount was spent in 1922 on improvements and extensions to the transmission and distribution systems.

Albuquerque is one of the most progressive cities in this region and is at the present making



Exterior of the Alvarado Hotel at Albuquerque, N. M., The city of Albuquerque presents to the easterner his first view of western civilization. The wares of the Indian squaws may be noticed in the center foreground.

rapid strides in its development, both architecturally and commercially. The accompanying photographs show some of the important building construction now under way. Perhaps the most imposing structure being built is the First National Bank Building, an eight-story stone bank and office building, which will cost when completed in the neighborhood of \$600,000. To take care of the transient visitors to the city, a syndicate of Albuquerque business men is erecting a beautiful modern hotel of the Spanish type architecture at a cost of \$350,000. This hotel will contain 164 rooms and will be completed and ready for occupancy in the near future. Extensive improvements costing \$300,000 on the Alvarado Hotel, one of the chain of hotels on the Santa Fe, under the management of Fred Harvey, have just been completed and as a result the capacity of the hostelry has been doubled.

An expansion program for the large shops of the Santa Fe Railway system, located at Albuquerque, is under way and should be completed within a month. This development comes as an addition to a modern machine shop which was completed during the past year at a cost for buildings and equipment of about \$3,000,000. Extensive additions and improvements to the boiler house are being made at the present time and when these are completed will have entailed an outlay of approximately \$100,000. The Santa Fe shops have the largest industrial payroll in the city, as they normally employ about 1,500 men. These men are all residents of Albuquerque and are good customers of the local stores.

Albuquerque, unlike many cities in the intermountain region to the north, and other cities to the south, is not supported by coal or metal mining. This is despite the fact that the only anthracite coal mines in the territory are but forty miles away from the city. Albuquerque is the distribution center for the state of New Mexico, serving as it does all of the other cities and towns in the state with its wholesaling facilities. This activity, coupled with the growth of livestock and melons and agriculture in general and industry, has been the contributing factor in the growth of the city. The University of

New Mexico and a number of health sanitariums are located there. Among the important industries are flour mills, ice plants, a large sawmill, planing mill and sash and door factory.

Serving this city and its surrounding territory with electricity is the task of the Albuquerque Gas & Electric Company. The company generates all



The First National Bank Building will be the largest building in Albuquerque when it is completed. The structure is being built entirely of stone and will be eight stories in height.

power by steam in its own plant. One of the unique features of this steam power plant is the fact that hog fuel or sawmill refuse is burned under some of the boilers for producing steam. This is surprising when it is considered that Albuquerque is located in a region with not the slightest vestige of timber in sight for hundreds of miles. Pine logs are shipped

in by rail, however, to a large sawmill located in the city. Slabs from the logs and other scrap from the mill are run through a hog, a machine with a series of knives, and are ground up into small pieces. This hog fuel, as it is called, is then carried by conveyor



Water to be used in the condensers of the steam-electric plant is cooled in this 9,000-gal. per min. spray cooling pond.

to the power plant some 500 ft. away and dumped in the open. It is then loaded into another conveyor as it is required and taken to the boiler room where it is fed directly into the furnaces through chutes without further handling.

The supply of fuel is limited and generally only enough is available to fire two boilers. These boilers are banked in with others under which coal is burned. Many steam power plants throughout the Northwest burn hog fuel extensively, but their fuel is a by-product of mills sawing fir, which does not present the difficult problems in firing that are experienced with refuse from a sawmill operating on pine. One of the great troubles experienced at the Albuquerque plant is that the fuel is frequently so dry and light, in spite of the fact that it is wet down, that it is carried up the stack before complete combustion has



Interior of fire-box in which hog fuel is being burned. The picture was taken shortly after the fire was lighted. The fire burns only on the outer surface of this cone shaped pile.

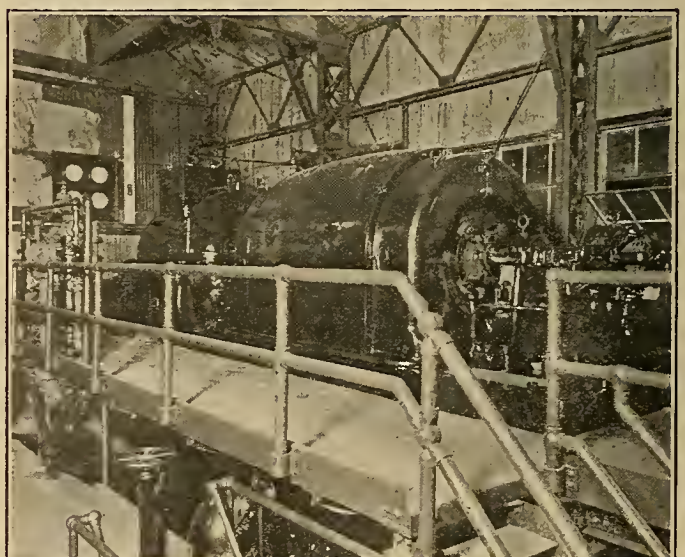
taken place. It is not uncommon to have a red hot smoke stack. Better combustion could be obtained in specially designed furnaces but the supply of fuel is uncertain and boilers must be equipped so that they can be thrown over onto coal on short notice.



This 164-room modern hotel is being built by a syndicate of Albuquerque business men at a cost of approximately \$350,000.

In keeping up the development of its plant, the Albuquerque Gas & Electric Company is planning the installation of several thousand dollars' worth of boiler room recording and testing instruments. The plans call for the purchase and installation of steam flow meters, CO₂ recorders, recording thermometers, etc. This equipment will aid greatly in operating the plant efficiently. One of the difficulties experienced by the company is the securing of sufficient quantities of cool pure water for condensers.

The Albuquerque Gas & Electric Company is owned by the Federal Light & Traction Company of New York City. This holding company owns and operates a number of plants throughout the West. Among these in the state of New Mexico, besides the one at Albuquerque, are the plants located at Las Vegas and Deming.



New 2,500-kva. turbo-generator installed at the plant of the Albuquerque Gas & Electric Company at a cost of \$100,000. The machine operates at 3,600 r.p.m., is rated at 2,300 volts.

Power Earnings and Comparative Public Wealth

WATER use has accepted generally certain primary obligations: First, the public health, the sustenance of life in the community. This is the highest use and is so affirmed. Second, the production of food for the community through irrigation, and third, the production of power for the conveniences and multifarious needs of the community. These three uses in their order have by common consent been practically written into the law of water use by common custom and usage.

Public opinion has in the past few years been undergoing a decided change relative to power development by private initiative. It has been well shown and amply demonstrated that in the main the large power companies are of most substantial investment character, serving an increasingly vital necessity to many thousands of customers, seeking few public favors except for public service, and rendering a dependable service that becomes so much a matter of course that an interruption of a few minutes appears the more remarkable by its infrequent occurrence. These companies as a class make a rather uniform earning, are restricted as to its amount by public bodies keenly sensitive to public complaint, and in the main have quietly moved into the most substantial and stable class of utility investments, constantly expanding to meet new demands for service.

Some years ago a hysterical era of name calling, muck raking, and political demagoguery dragged into its filthy arena all large corporations and particularly public service corporations, for abuse and vituperation, at least in part, to the end that the authors of the hysteria and these self-seeking prophets of the public weal might reap brief public acclamation. Out of all this slime came many charges, but the power companies had probably fewer charges to defend than most, although we still have echoes of the term "Power trust."

In the name of irrigation much of the best engineering of the age has been directed toward the use of otherwise incompetent lands for the production of food and for the support of an agricultural population. The public wealth of the communities in which waters have been applied intelligently to otherwise useless areas has rapidly and materially increased. Of this much has been said and written and need not be reiterated here. There have been many failures and some sad scandals, but these have been incidental. But the utilization of our great water

By G. B. Herington
Consulting Engineer, Portland, Oregon

THE comparative economics of any large water diversion may well be studied as to its effect on the community by its use applied to either irrigation or power. Mr. Herington points out that wealth created for power operators by returns on investments in power properties bears but a small proportion to the increase in wealth in the community availing itself of the power furnished.

powers has been so quietly made and has become so much a matter of course, that little has been noted of the general effect and the increase of public wealth concurrent therewith, or of the increasing amount of power use that goes into the daily process and consumption of the average person.

It has become the fashion to quite freely announce and accept the great wealth produced by water applied to irrigation purposes, but little has been said or written of the comparative wealth which may be created by the same water applied to either irrigation or power.

Comparative Values of Power and Irrigation

In California and generally in Washington, the power use comes as an initial application of the water, due to the natural topographical make-up, and after giving off power by its drop, the tailing is used for irrigation on the lands below, these being so situated as to accomplish generally both purposes in an orderly and highly economical way. In Oregon particularly and in other parts of the Northwest and Rocky Mountain region, much land of at least fair irrigable value exists above the main water drops. The main agricultural wealth of the state of Oregon will probably always come from an increasingly effective use of the more ideally situated lower valley lands.

For the purpose of comparatively studying the two sources of wealth the writer recently made a somewhat exhaustive statistical research. It almost immediately became apparent that the wealth created for power operators by returns on investment in power properties, held only a small ratio to that which the use of applied power created in the community availing itself of the power furnished.

By reducing these figures to comparative arbitraries, here quoted only as indices and with a view to bringing the matter into a somewhat empirically concrete and rational form, these certain very general figures were obtained and have been checked out as somewhat fair average values by comparisons in detail as to a very considerable variety of industries making use of electrical power in their processes. An application of some of these figures has a bearing on the matters under discussion herein.

The Productiveness of Irrigation

An irrigation proposal now current for watering 140,000 acres of only moderately good land, calls for

the initial and final use of certain water having otherwise exceptional power potentiality, under a moderate development cost, of about 150,000 hp., all within easy transmission distance of one of our greater Pacific Coast cities.

In the irrigation of this particular land there may be expected as a result:

1. An ultimate net increase of land values above cost, assessments and present values of \$50 per acre..... \$7,000,000
2. On complete settlement an annual production above labor costs and above present products, per acre @ \$40..... \$5,600,000
3. An increase of population of, say, one family of 3 per 50 acres, in this case..8,400 people
4. Or a production in new wealth per supported person of annually.....\$ 666
5. And an increase in estate per person supported on capital value..... \$ 833

The increase of effect in taxable values will largely be absorbed locally for community improvements generated by this new population.

A Parallel Application for Power

In general relation the following figures may be taken as a somewhat approximate general index from the known results of parallel application of power as here related, to a unit of 150,000 hp. by probable investment and use beyond that required in its actual production and distribution; in other words, the public use induced by availability and actual application of offered actual power, may be relatively and for general rational purposes, comparatively stated and deduced as to units of power used, somewhere around the following values:

| | | Unit of One Applied Hp. |
|--|---------------|----------------------------|
| In plant, etc., capital invested for using power.... | \$150,000,000 | \$1,000.00 |
| In annual payrolls..... | 35,000,000 | 260.00 |
| In people employed..... | 40,000 | .35 |
| In people supported, to be fed and clothed | 180,000 | 1.20 |
| In annual expenditure for raw materials to be manufactured and general overheads | 96,000,000 | 740.00 |
| In annual value of product finally | 165,000,000 | 1,100.00 |
| In profit of manufacture for distribution and partial re-investment | 34,000,000 | 240.00 |

A study of the general history of the localities surrounding all large offered powers, indicates that within a very short time after the power has become available and on the market, the manufacturing of raw products available is rapidly increased and power-dependent industry accelerated, and the owners of most such powers find themselves seeking a doubling of output within a comparatively short term of years. The Niagara Falls, Keokuk, South-

ern, Eastern and general California experience all bear this out, while New England's water powers are an index of her industrial activity to a considerable extent.

The comparative economics of any large water diversions may be well studied and compared as to their effect from this standpoint, and a gradual public realization of the ratio of the power investors' earnings to those of the community may well result from continued study of such matters and publication of the results in popular form can only offer added interest on the part of the public.

Greatest Productivity Must Be Secured

Food must be produced, the public be provided therewith at reasonable cost, and the water for public health be conserved, but there must arise a realization of the real potentialities in the latent water power of the country and its best use either by private or public development properly directed to offer the greatest productivity and yield.

Irrigation use in itself offers but one increase in capital and taxable value, then a fairly uniform yield of income from operation.

Power offers a usually safe investment and small percentage reward to its producers, but to the general commonwealth a vastly greater general wealth producing effect.

When the same water can do both services, or still further handle in part a public health use, the general economical development for the greatest benefit of the affected public becomes a reality.

When potential cheap power is fully demobilized at the source through the water being taken for irrigation, which finishes the further potential usefulness of the water within the process of such use, then the land must be of such productivity and potential crop producing power, or the product be so seriously needed as to make such diversion fully a public necessity in the face of the comparative wealth producing activity of the same unit of water for power purposes.

The present situation is in reality that there is no lack of irrigated lands awaiting settlement, but a lack of willing settlers and many irrigated areas of unquestioned merit are but half filled with settlers.

Need for Further Study Apparent

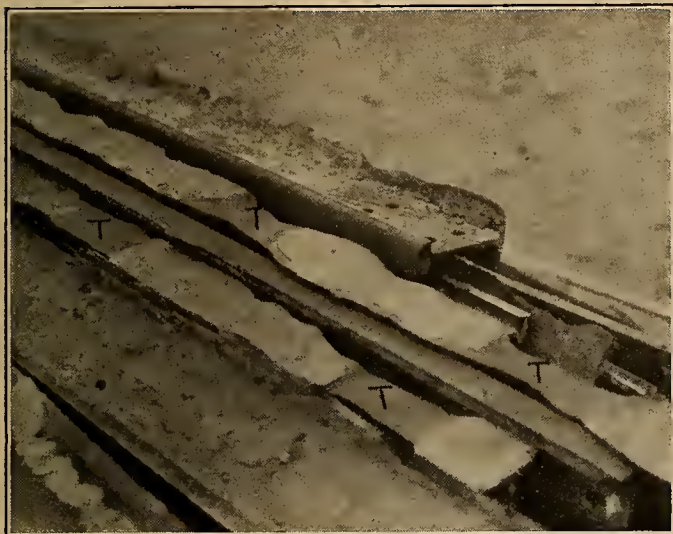
The field of ultimate public power benefits has so far been too little studied and the known economics thereof too narrowly promulgated for the apparent comparative values to be properly known and appreciated, most study so far generally disseminated having been directed toward analysis of the direct earnings from production and distribution alone.

The largest powers are in the West and so far only scratched in their development, but the acceleration of demand is already taxing construction capacity, and with the peculiar combination of manufacturing and marketing possibilities the Pacific Coast offers, they will continue to accelerate in all probability at yet an entirely unforeseeable rate.

Rail Bases Are Destroyed Through Electrolytic Action

THE effect of electrolytic action on rails of an electric railway system presents a serious problem to operating companies. Especially at points where the tracks of the system cross water mains at right angles or are close to the reinforcing steel of large buildings is this action most pronounced.

The accompanying illustration shows the badly damaged condition of 8-in. T-rail bases after 29 years of service on an electric railway system in the West. The electrolytic action was most rapid over the ties; the illustration shows two rails, bottom up, with points where the base rested on the tie marked "T." At these points the rail base had been eaten away, both in width and thickness much more than



Rails showing the effect of electrolytic action. At the points marked "T" where the rail base was in contact with the tie the action was more pronounced than it was on other parts.

at other sections. The part of the line from which these rails were removed was in filled ground which was always wet. The damage was fairly uniform all along a $\frac{1}{2}$ -mile length of double track line.

Damage to the rail head and web was comparatively slight, the serious disintegration being confined to the base. These rails were taken out of service on account of the destructive electrolytic action, i.e., neither the wear on the rail head nor the necessity for substituting another rail section would have required the removal of the rails at the time they were taken out of service.

Another unique case of electrolytic action on rails was the case where the tracks of a railway passed close to one of the company's substations. In this case the entire base of the rail has been eaten away.

Two fairly effective means have been employed by street railway companies in overcoming electrolysis. In properly bonded rails, especially of the welded type, electrolysis is very slight. Well drained roadbeds are another means of mitigating the effect. In cases where the tracks cross a group of water mains it has often been found necessary to use artificial drainage on the roadbeds.

New Million-Volt Laboratory Will Serve as Experimental Station

THAT the function of the modern technical college is more than the educating of undergraduate students who come to get the fundamentals of engineering subjects, is a fact admitted by a large proportion of the faculties of the many technical institutions located in the United States. One of the particular functions to be performed by these colleges is the conducting of research work, that the engineering world which these colleges are concerned with may receive new ideas gained from the experiments conducted by the members of the faculty and graduate students enrolled there.

Some time ago the California Institute of Technology of Pasadena, Calif., decided to enter the field



The new million-volt laboratory of the California Institute of Technology will be similar to the Norman Bridge Physics Laboratory, shown above. This building was opened last year.

of electrical research and preparations were made for the erection of a million-volt laboratory in which experiments with high voltage current could be conducted. Dr. Robert A. Millikan, winner of the Edison medal for 1922, will be the director of the laboratory which will be opened about the first of June.

In arranging for this newest laboratory, the Institute secured the aid of the Southern California Edison Company as this company is particularly interested in high-voltage transmission. Previous to the erecting of the million-volt laboratory, the Edison company had been conducting many experiments with its 27-mile testing line which it operated at 240,000 volts. The success of the experiments led to the adoption of the 220,000-volt line which will operate between the Big Creek plants of the company and its Eagle Rock substation.

The new laboratory will provide the Institute and also the engineers of California, with facilities to continue these experiments. The million-volt transformer which will be used in experimental work is one designed by Professor R. W. Sorensen of the Institute and manufactured by the Westinghouse Electric & Manufacturing Company.

This transformer is designed to be installed in four units and the building is so designed that the reinforcement in the structure will act as a metal shield to the transformer.

ELECTRICITY IN INDUSTRY



By Louis F. Leurey
Industrial Electrical Engineer

Modern Electrical Installation in Plant of Nevada Gypsum Company

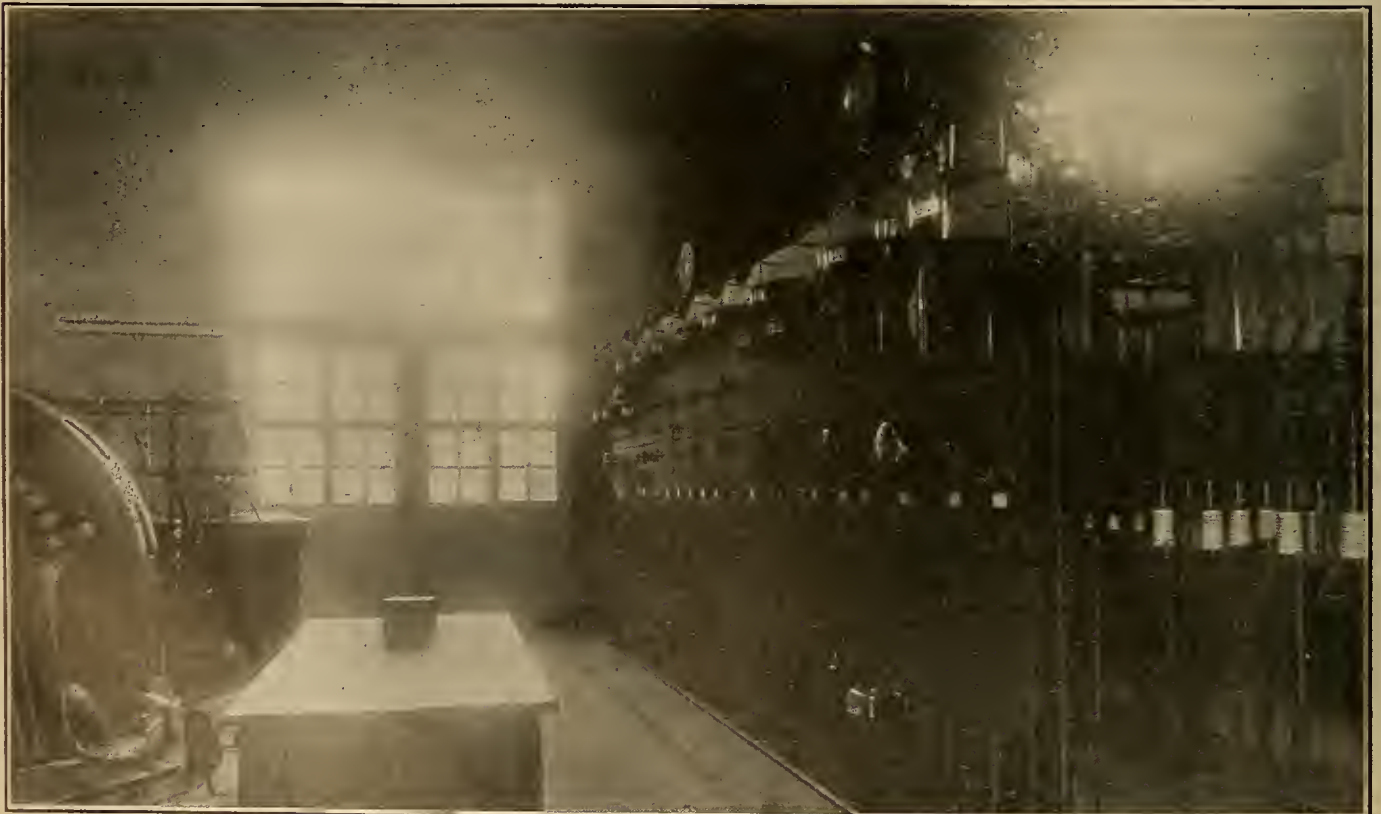
THE Pacific Portland Cement Company of San Francisco, under the direction of W. C. Stevenson, the chief engineer, is now preparing to build a plant for the manufacture of gypsum plaster at Gerlach, Nev. This plant contains a number of interesting electrical features and is a self contained unit including its own central station generating plant.

The generating plant will be located approximately 350 ft. from the group of four industrial buildings and the enclosed plant will consist of three Ingersoll-Rand oil engines driving three General Electric 675-kva. generators to operate at 480 volts, three-phase, 60 cycles. All motors in the plant are for 480-volt operation and consequently no transformation losses occur in the distribution system with the exception of a single line of 300-kva. capacity

which is stepped up to 11,000 volts for transmission to the quarry which is five and a half miles distant from the industrial plant.

The main switchboard of the generating plant is designed according to the most advanced practice in industrial boards of this type. The board proper consists of 90-in. slate panels and will be completely equipped with both indicating and recording instruments. Embedded temperature coils in each generator are connected to temperature indicators on the switchboard.

The oil switches are remote mechanically controlled and erected with the busbars on a special pipe frame structure with clear passageways between this structure and the back of the switchboard and between this structure and the rear wall. All instruments on the switchboard will have transformers ahead of their potential coils so that no voltage in excess of 110 volts will exist on the switchboard panels.



A switchboard similar to the one shown above, controls the electrical equipment installed in the plant of the Pacific Portland Cement Company. Temperature coils on each generator installed are connected with indicators on the switchboard.

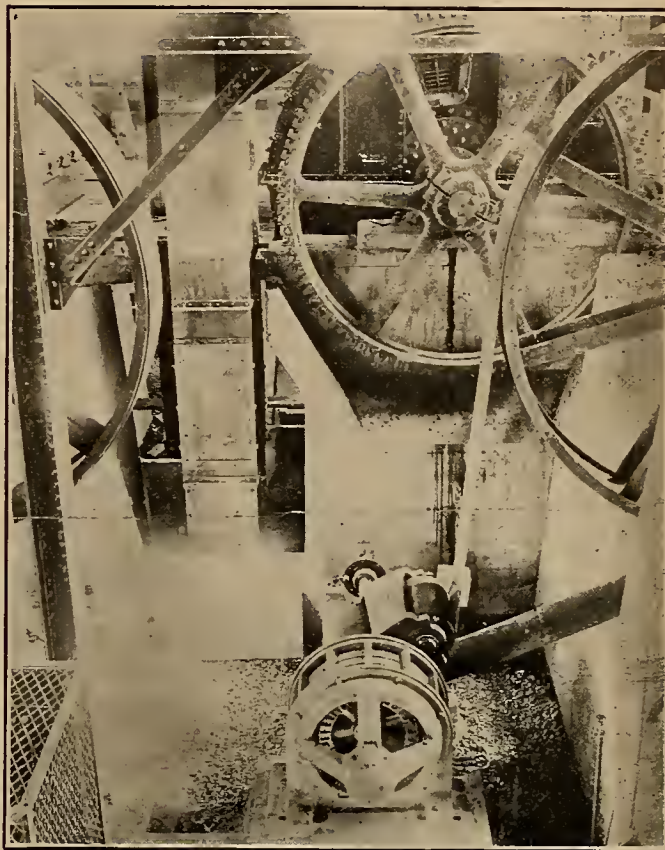
Special care was given in planning the motors in this plant to see that they were suited as exactly as possible to the contemplated drive. In all drives where the starting conditions were heavy, wound rotor motors were specified having magnetic contactors in the primary circuit, which contactors are electrically interlocked with drum controllers that are to be installed in the slip ring circuit. This will prevent the starting of any of these motors unless the drum controller is in the neutral position.

Special attention has also been given to trains of conveyors where these trains carry product direct one from the other. In such trains of conveyors magnetic contactors are installed and control wiring so arranged that the receiving conveyors must always be started first before it is possible to start the delivery conveyors. In a similar manner, the interlock is so arranged that if the receiving conveyor accidentally shuts down it will also trip the delivery conveyor.

A further point which received special consideration in this plant is a study of labor saving control so that it will require a minimum number of men to start and properly operate the various motor drives. In a number of cases this has resulted in the decision to install automatic enclosed starting compensators with iron clad safety push button control so that the operator can start these motors safely and accurately from a distant point. In all such cases where these automatic compensators have been installed, the personal safety features have been carefully guarded by properly housing the motor and its drive and by installing externally operated safety disconnecting switches near the motors so that when any work is necessary a local controllable cutout switch is available.

A most interesting feature of this development is a five and a half mile cable and bucket type of tram which is used for transporting materials from the quarry to the plant. In connection with the drive of this tram, it developed that approximately

15 hp. would drive it under normal operating conditions but that in the early morning hours after very cold nights it might require approximately 50 hp. to get it started. To meet this problem and to insure the necessary high power factor during normal operating conditions it is planned to install two speed



Electric drive is used extensively throughout the modern cement mill. The installation pictured is typical of those now in use in the cement mills of the Pacific Coast territory.

variable speed wound rotor motors having a maximum capacity of 50 hp. at 1,200 r.p.m. and approximately 20 hp. at 600 r.p.m.



The Pacific Portland Cement Company manufactures cement in addition to gypsum plaster. The kiln room pictured is representative of equipment installed in modern cement mills in the West in which electricity plays an important part.

JOBBER, DEALER AND SALES AGENT



Cooperative Effort in Educating the Community

A Summary of the Duties of a Cooperative League as Outlined by

K. A. McIntyre of the Society for Electrical Development

The part played by the local cooperative campaign or development league in solving some of the problems which are confronting the electrical industry at the present time has been concisely outlined by K. A. McIntyre, western field representative for the Society for Electrical Development, in a recent talk before the Denver Electrical League and again before the commercial representatives of the Denver Gas & Electric Light Company. Mr. McIntyre said in part:

"In the electrical industry there are two types of organization. Everyone is familiar with the National Electric Light Association and its operation, continuously working along lines leading toward the solution of technical and commercial problems connected with the central station end of the industry. The contractors, jobbers and manufacturers have their organizations. Then there is the second type of organization which has a different method of operation and different objects and that is the Cooperative Development Organization. We have the two forms of that organization, the one operating on a national scale, known as the Society for Electrical Development, and the second form of that same type of organization, the local development league.

"The object of that type of organization is to develop and promote the industry as a whole and then by participating in that and taking advantage of that work we will get our share of the increased development resulting from that work. Naturally, the support for this broad development program comes from the entire industry and not any one group and the work that is done by this type of organization is done for the whole industry, and so we have the different types of organizations working on the problems, the main point of which I have illustrated here, i.e., that our electrical achievements are far short of our pertinent possibilities, and I have a few statistics here which will readily prove this to you.

"In residence lighting a survey of 1,500 homes shows that the lighting in the average home is only 40 per cent of what it should be on a minimum basis for good lighting. This is in connected load or watts. There are about 26 per cent of the lamps shaded, only 13 per cent of them properly so. Here we have a splendid opportunity for more business but back of that lies something more important and that is the service idea. As an industry we are not rendering the public very good

service when we permit this condition to obtain in the home. The matter of good vision is very necessary to comfort in life and the conservation of the eyesight of the young and old depends a great deal on the kind of lighting in the home. Today we do not live as did our ancestors, going to bed shortly after dark. Today is the day of artificial illumination and it behooves us to provide for the public good illumination for the conservation of vision.

"In regard to convenience outlets and necessary wiring, there were found to be in these 1,500 homes, not in one city but many cities, only two convenience outlets where there should have been nine outlets for the average home, twenty-two per cent of what there should have been on a minimum basis. It is hard to rate necessary wiring, but we do know it is anywhere from 15 to 50 per cent of what it should be and not on an electric home standard. Many of you are concerned with the direct sale of labor saving appliances in the home. The great development of these devices has come within the last ten years but the development of wiring in the home to serve those devices has not kept pace at all with the development in the appliances themselves, so we have this condition tying in inseparably with our work in trying to sell complete electric service. If we have incomplete or inadequate wiring to serve what we sell there will not be maximum results from its use. Also, oftentimes we will find it difficult or impossible to complete a sale because it will require considerable additional wiring at a great expense, whereas with that home properly wired in the first place it would be far easier to sell the device and greater satisfaction would result from the use of the service.

"In industrial lighting the estimate shows that from 25 to 40 per cent of the plants of the country are lighted only on a minimum basis. There is a wonderful opportunity for improving that condition. It is difficult to find a figure to quickly visualize the possibilities for industrial power and water applications, but I have selected this figure of \$185,000,000 which is an estimate of what it costs the American industry in a year from loss in line shafting. There is a very tempting opportunity there for digging a hole in that \$185,000,000 by the increased use of smaller group drive and individual motor drive.

"Then there is the appliance field. There are, I believe, 9,000,000 automo-

biles and only 2,000,000 electric washers. That is quite a contrast when you compare the price of automobiles with the price of washers. It just comes back to the point and supports my statement that electrically we are far short of even our electrical possibilities and I would like to make clear this thought,—that in the development of the electrical industry we are contenting ourselves with the contemplation of the wonderful growth we have attained in the short 40 or so years of our existence, while as a matter of fact most of that development has been due to invention, discoveries and new improvements rather than to concerted effort on our part. We are going to have that same sort of growth in the future. We have nothing to do with it, really, and what we are concerned with is this fact,—that we are far short of our possibilities and we want to increase our standing from where we are to what we ought to be, in other words, increase the normal rate of development.

"The principal reason for this condition is that the public does not know. You are up against that every day. The electrical contractor and wiring man in trying to sell more wiring is up against the proposition that the public does not know and it makes it difficult for him to sell the proper wiring job. In practically every sale that you make you meet this same thought. You first have to inform and then convince your prospect of a lot of ordinary, every-day electrical things with which they ought to be familiar. You have to dispel that before you can break down the normal sales resistance and complete your sale.

"The responsibility for correcting this condition rests on the electrical industry and those who engage in this cooperative development work, recognizing the responsibility it carries, are being considered as a part of our service as an industry to the public, supplying them with correct information, all of this designed to bring about the condition of an intelligent, well informed public. The best means is publicity in its many forms, and publicity may mean anything from newspaper items to an electrical home or other demonstrations or educational exhibits. There are many methods that can be put over by means of the local organization and all of these methods aim at informing the public as to the comfort, convenience and economy of electric service, and at the same time endeavoring to create in their minds the desire to avail themselves of this electric service. In doing this job we have great odds against us and to illustrate this I have used the figures 328 to 1. There are 115,000,000 people in the United States and Canada and only approximately 350,000 in the elec-

trical industry, so we will have to work together if we are going to do this. In that connection there are only a few of the 350,000 who are on the job. Many men and women in the electrical industry regard their jobs only as a meal ticket. They do not get the idea that they are a part of a wonderful, growing, essential industry, nor do they stop to realize that their whole opportunity for personal advancement depends largely upon the growth of electrical industry, that it is a part of their job to bring about this condition, and to help build the foundation."

Mock Trial Reveals Advantages of Electric Washer

That indirect advertising is an effective method of arousing in the mind of the public a maximum amount of interest regarding electric household appliances has been proven by the West-

nity where a contractor-dealer, jobber or manufacturer desires to sell both the electrical idea and his own products.

In the case in question a prominent citizen of Belvedere, Calif., was haled into court for the high crime of failing to provide his wife with the means for properly doing the family washing. The mock trial was held before Degree Staff of the Pythian Sisters and so great was the interest aroused that the hall where the trial was held was crowded to capacity on the night of the trial. Approximately 1,500 men and women attended. Requests have been received from other fraternal orders in the district to stage similar affairs, and two trials have been held subsequently.

Local interest was secured because all of the participants in the trial were local people. The attorneys for the prosecution and defendants were bona fide lawyers and both entered into the spirit of the occasion to such a degree that even the spectators were convinced that the trial was real.

Each member of the Pythian order was notified of the trial by an official-looking summons, a reproduction of which is shown. The text of the summons follows:

IN THE HIGH COURT OF THE DEGREE STAFF OF THE PYTHIAN SISTERS IN AND FOR THE DISTRICT OF BELVEDERE.

The People of the Degree Staff
of the Pythian Sisters
of Belvedere.

vs. NOTICE AND ORDER.
R. E. Hellems,
Defendant.

TO THE PEOPLE OF BELVEDERE, GREETING:

You and each of you are hereby commanded to be and appear at the trial of the defendant, R. E. Hellems, who has been duly charged with a grave crime, to-wit: the failure to provide his wife with the proper equipment for doing the family washing.

You are hereby ordered to come prepared to give whatever testimony possible touching the general habits, character and responsibility of this defendant to the end that justice may be meted out, and that the danger which now threatens the homes of all the women of our beautiful community of Belvedere may be averted.

The trial will be held at the Court Rooms at the corner of First and Rowan Streets, Friday, November 10th, at 8 o'clock, P.M.

Attorney for the people, D. W. Garwood, will do his best to protect the community; Charles E. R. Fulcher, will fight equally hard to keep his client from the grave penalty of having to spend some of his money to make the housework easier.

GUY F. BUSH,
Judge of the Court.

Prominently displayed on the stand on the night of the trial was a modern electric washer while beside it was a tub, washboard and boiler. Before the case was finished all of the many advantages of the electric way of washing as compared to the old-fashioned way were brought out and in the end the jury found the defendant guilty of gross cruelty.

So simple is this method of indirectly bringing to the attention of the men and women of the community the advantages of the electric washing machine that it can be applied in any community where an enterprising contractor-dealer will secure the cooperation of the members of a fraternal order or women's club.

YANKING HOME THE YEN

By JOE OSIER

"Just scales and full measure injure no man," remarked Too Fat, the Exalted Ruler of the now celebrated High Hip Tong—

As he flicked a fleck of fuzz from his embroidered silk kimono, took an extra sip of Chinese gin and went on with his address entitled:

"Yanking Home the Yen."

"You are aware, brother tongmen," he asserted, "that we are in business for some other purpose than—

"Wearing out our old clothes.

"We have sampans to keep afloat and seaworthy; we have children whose little stomachs cry for chop suey; we have wives who daily chide us because we are not as affluent as—

"Louie Lung and thus and so—

"Therefore, my friends, it is up to us to collect the yen and the sen which we have earned.

"Know ye, that it is better to take eight hundred cash than give credit for a thousand and—

"If you pelt dogs with meat dumpings you will lose all and get nothing!"

After hurling the above to posterity, Too Fat walked from the stage amid a tumult of hand spitting and retired to his counting house where he said—

"No can do" to fifty borrowers during the remainder of his shift.

Now, if Chinese business men deem it imperative to make collections, why should not those engaged in the electrical industry, do likewise?

They, too, have installments to pay, homes to maintain, kiddies to feed and wives to bedeck and—

If they do this and keep out of court, they must—

Collect the collateral before the debt is outlawed or—

Their debtors have died.

I have been informed that many firms go down the—

Long, wrong trail—

Because they were lax in making collections; because they feared to offend by making demands for money; because they would rather—

Die than dun.

This attitude, I swear by the beaver of a bard, is preposterous—for—

Any business man, worthy of credit, will agree that a demand for money, honestly earned,—

Is the proper checker—and—

That the boys who do not call for their clams should be measured for—

Wings and harps and wafted on their way.

I fully realize that business is a matter of credit, more or less—still—

I feel prompted to state that if there was more cash and less credit in business—

There would be more business men smoking cigars—

Made of tobacco and—

More industries assuring suitable return on the "bees and honey" invested.

I may be wrong but—for the sake of this column, I will not admit it and—

Seeing that I cannot argue further, owing to lack of space, I shall call it a day and—

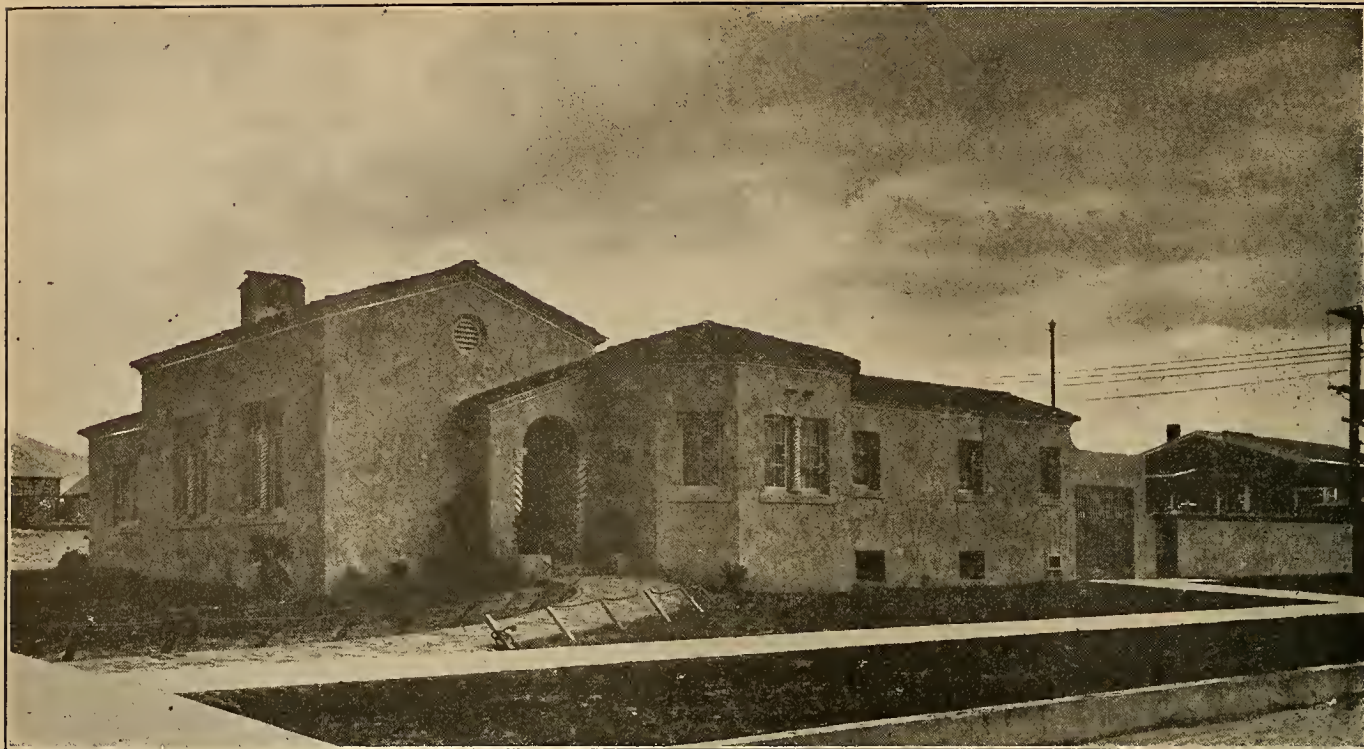
Turn over the floor to the opposition.

To't, brothers.

| | |
|--|------------|
| No. | Dept. |
| In the | |
| HIGH COURT | |
| of the | |
| Degree Staff of the Pythian Sisters | |
| In and for the District of Belvedere | |
| Notice and Order | |
| THE PEOPLE OF THE DEGREE STAFF OF THE PYTHIAN SISTERS OF BELVEDERE | |
| vs. | |
| R. E. HELLEMS, | |
| Defendant. | |

Official looking summons employed to arouse public interest in the trial.

ern Electric Company and the S & H Electric Service Company in Los Angeles. The means employed are so simple as to be applicable in any commu-



Because a large percentage of the people of El Paso, Tex., are of Spanish descent, the El Paso Electric Cooperative Association decided to have the Electrical Home, that it displayed, built on the Spanish type of architecture. The home pictured above was visited by nearly 11,000 people.

The New Spanish Type Electrical Home in El Paso

Largest Appliance Sales Ever Recorded in City Resulted From Publicity Gained in Displaying Modern Home

The home electric exhibition which was held recently in El Paso, Tex., resulted in the largest merchandise and appliance sales ever recorded in the history of the electrical industry in that city, according to the report of the El Paso Electric Cooperative Association, under whose auspices the showing was held. These sales included some of the larger appliances, such as refrigerators and electric ranges. In addition, the contractors of the city have felt an increase in business, one firm having received a contract to wire four houses in the same manner as the one shown. The non-electrical organizations which cooperated in the exhibition, such as furniture dealers, also report sales traceable directly to the home.

A total of 10,982 people visited the house, which is a good percentage of El Paso's population of 80,000, 60 per cent of whom are Mexicans. Based on the attendance and total cost of advertising, the home was displayed at a cost to the association of approximately 2¼ cents per visitor.

In arranging for the display of the home, an organization known as the El Paso Electric Cooperative Association was formed by the electrical manufacturers, dealers, contractors, jobbers and central station of the city. This association was to foster the cost of the electrical home and was to contribute to the cost of advertising and exhibiting the home. The house was financed by C. A. Winder, the El Paso manager of the Southwest General Electric Company. Subscriptions were taken from all of the members of the association and funds secured in this way were used in displaying the home to the people of El Paso.

Arrangements were made with the various furniture dealers to furnish all of the furniture, electric piano, electric phonograph, etc., for display purposes. These firms received their compensation from the advertising that their products received while being viewed in the home.

Wiring materials and electrical equipment for permanent use in the home, such as range, water heater, refrigerator, etc., were furnished by the manufacturers at actual factory cost plus transportation charges. Electrical appliances for display purposes were furnished by the various electrical dealers, at no cost to the association. Electrical contractors who wired the house did so at their own cost for labor, and the general contractors built the house at actual cost to them.

In this way the cost of erecting the house and of supplying it with equipment for display purposes was held down to a minimum, thus giving the association the opportunity to keep the cost per visitor at a remarkably low figure. The final figures prepared by the executive committee showed that the association spent a total of \$2,500 for advertising, publicity and exhibiting the home to the 10,982 visitors.

The members of the association realized that the body was too large to work as a unit in directing the policies of the home and decided to have committees named to direct the several branches of the work. An executive committee with powers for general supervision of the financing and constructing of the home, was appointed. This committee was aided by an advertising and publicity committee, a house committee, a decorating committee, a wir-

ing and inspection committee, an appliance committee and an illuminating committee. These sub-committees supervised the details of erecting and exhibiting the home. All of the factors represented in the association were represented on each committee in proportion to their qualifications for giving advice on the particular task assigned to the committee members.

Appliances to be displayed in the home were selected by the appliance committee from the stocks of the electrical dealers and jobbers in the city, a few appliances being taken from each establishment. In the case of equipment such as range, clothes washer, dish washer, etc., the various firms handling these appliances were allowed to have their appliance on display at given periods. All cost of hauling to and from the home and costs of any damage done to equipment was stood by the firm owning it.

The house committee had full charge of the displaying of the home. Matting and iron posts with suitably painted chains were placed throughout the house so that visitors would not be walking all over the rugs or picking up appliances and the like, or marring the appliances, furniture or fixtures. This facilitated the handling of the crowds.

At the main entrance, which was a door leading into the living room, through which all people entered the house, a negro porter in full dress uniform received the visitors. He was also furnished with a small counter and kept track of the number of visitors. It was found necessary to permit people in no larger crowds than ten or twelve. On days when the crowds were large there was a man stationed in each room, describing in detail the advantages of the use and convenience of electricity, and other matters of interest in that particular room. However, on days when the crowds were light and the people

came in small groups, one man would take a group entirely through the house. After the people were taken entirely through the home they left by way of the garage, where a young lady was stationed who registered the names and addresses of all visitors, at the same time giving them a pamphlet describing the home in detail. This plan of having the people register and giving out pamphlets at the end of the journey proved a great deal more satisfactory than if the registering were done as they entered the home.

The home was extensively advertised in the newspapers, on billboards, street cars, show windows and by pamphlets, and publicity in various other forms. The planning of all advertising and publicity was done by the advertising committee and then approved by the chairman of the executive committee.

Newspaper advertising was divided into two classes, namely, direct display advertising and tie-in advertising. The first consisted of large display advertisements outlining what the home meant to the community in the way of better and more convenient homes and the distinctive electrical features which this home afforded. The tie-in advertising in newspapers was done by the electrical contractors, dealers, power company and other electrical interests, in which either the whole or a part of the space was devoted to advertising the electrical home, and inviting the public to visit it. This form of advertising was also carried on by the furniture firms, music houses, plumbers, general contractors and others concerned in the home.

The association secured billboard advertising opposite the Hotel Del Norte, which is the principal hotel in the city, and one at Five Points, an important gateway to the various residential districts. Boards were finished in many colors and were very attractive. These boards showed Aladdin as the magic servant and first called the reader's attention to the fact that there was an electric home under construction. Later they were changed to read "Home now open."

Street car advertising consisted of advertisements carried on the dashboards of all street cars for at least two weeks before the home opened and for the entire time that the home was



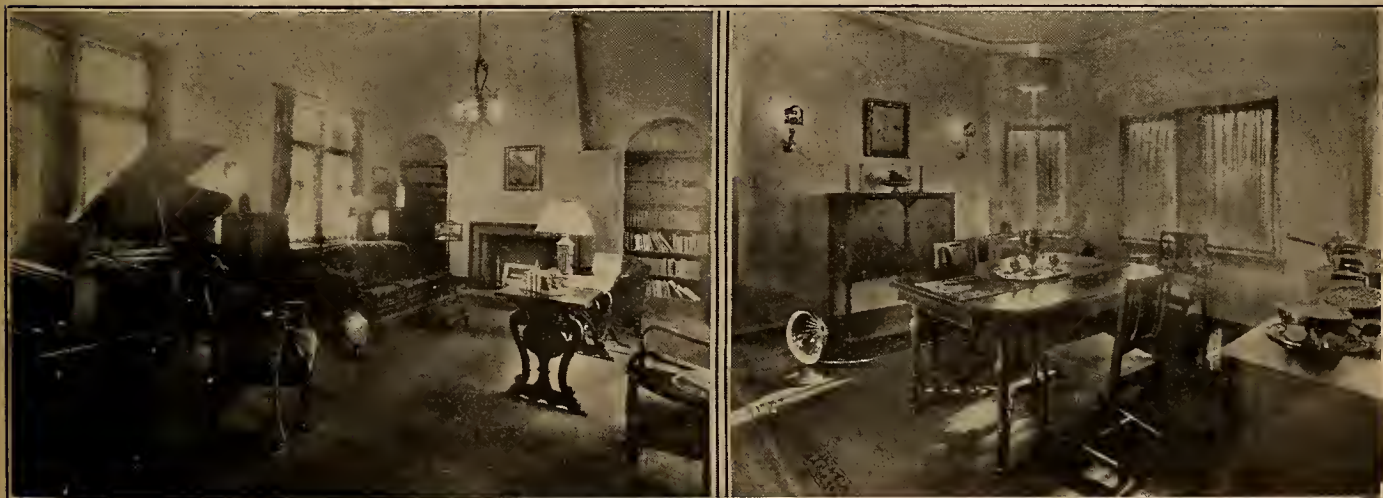
The kitchen of the El Paso home was modern in every detail. Sufficient appliances to make it completely electrical were installed and care taken to have ample convenience outlets for the devices.

being demonstrated. On the principal thoroughfare leading from town to the electrical home, board advertisements were placed on the lighting poles which read, "Follow the Arrow to the Electric Home." Moving picture slides were used during the first ten days that the home was exhibited. Stickers were placed on the bills sent out by the central station, various manufacturers and contractors.

The most important publicity for the home was in the form of news stories in the daily papers. The various members of committees prepared at various times before the home was opened and while it was being exhibited, news items regarding the home. The articles called attention to the lighting, furnishing and various items of interest. Before and during the time the house was being exhibited talks were made by members of the association before the various luncheon clubs, civic clubs and by radio.

While the home was being exhibited, an illustrated booklet entitled "My Own Electric Home in El Paso" was distributed to the guests. This booklet carried a number which corresponded to the number on the guest register that each visitor signed. Each day that the home was on display a drawing was held and the person holding the winning number was presented with an electrical appliance donated by the members of the association. The booklet contained floor plans of the home and the type-matter described the way a modern woman would have her home equipped.

The home was opened to the public for inspection Dec. 10 and remained open throughout the rest of the month. On the first day, which was a Sunday, the home was opened at 2 p.m. and closed at 10 p.m. The remainder of the time it was open for inspection from 10 a.m. to 10 p.m. except on Christmas Day, when it was closed all day.



The living room and dining room of the home received careful attention from the electrical men that these rooms might be illuminated correctly and sufficiently. Ceiling fixtures supplied the general illumination and were supplemented by wall brackets and artistic table and floor lamps.

An Electrical Jobber's Direct-by-Mail Advertising

Separate Lists for Each Class of Dealers Permits Advertiser to Send Specialized Literature to Customers

By JOHN T. BARTLETT

The problem of selecting a group of names to be used for mailing lists has always been one of the stumbling-blocks met by the electrical jobber or dealer who is starting a campaign of sales letters or advertising circulars. Many times the advertiser has had a list compiled which includes the names of all prospects and has mailed letters to these persons to find that a large percentage has brought no results.

The electrical jobber or dealer has a large number of products to sell and naturally all of his prospects will not be interested in the same devices. Because of this condition the advertiser must send a different type of advertising matter to each class of prospective customers, if he wishes to obtain the best results from his appropriation.

In embarking upon a mail advertising campaign, the person in charge should first select the list to which the letters are to be sent and then should decide on some definite schedule to be followed in the campaign. A third consideration in planning for sales-letter distribution is that the letter should carry the individuality of the firm to the prospect, as the letter is the representative of the firm.

John J. Cooper, of the Mountain Electric Company of Denver, Colo., has worked out a system for circularizing his dealer customers which has proved exceedingly successful. The electrical dealers that purchase from this jobbing firm are of many classes and serve a wide variety of customers. It is therefore necessary that some definite grouping of names be made for the advertising lists that are sent out monthly.

Mr. Cooper, therefore, draws up for himself at the beginning of each year a mail advertising schedule. It is in score card form, with different departments of the business down the left side, and months of the year above the longitudinal divisions. Month to month, Mr. Cooper checks on this, his "performance."

The schedule is not always absolutely followed. Last year, in the rush of things, for example, Mr. Cooper slipped up on lamps. Other lines received proper attention, however. For the past two or three years, this Denver jobber has followed a simple, yet comprehensive, system of direct mail advertising. He has obtained results from it and made satisfactory accomplishment in directions he started.

On the score-card arrangement alluded to, there appear down the left side, in order, Hotpoint, Fans, Motors, Meters, Lamps, General-Breezelet. These are the classifications Mr. Cooper has separated his business into for mail advertising. All but one he plans to advertise throughout the year. The one is Fans. Fans are advertised monthly up to July 15. Motors are advertised monthly, with a large mailing card. General-Breezelet, has reference to a large list to which letters advertising various articles are sent, along with the Mountain Breezelet, quoting prices and discounts on many lines. On Hotpoint,

which heads the list, letters are sent monthly throughout the year.

For each of these various classifications, an individual list is used. This means that advertising on a certain line is sent only to possible buyers of that line; waste is kept down, advertising effectiveness increased.

Ask a group of representative Colorado electrical dealers about interesting sales-letters they get, and it is a ten to one shot that the majority will mention "letters from Cooper." Talking about his advertising experience, Mr. Cooper explained that he started using letters regularly with several objects in view. One was to bridge, in a way, the gaps between visits of his salesmen to dealers, as there are often quite long intervals between these visits. Another purpose was to hammer away at certain things of fundamental importance in good retailing—turnover, particularly. Another, one might describe as "dealer fight"—an aggressive attitude toward business. On top of these things, of course, were selling arguments in behalf of different lines of merchandise.

Nobody questions that Mr. Cooper's letters do help to bridge gaps. Mr. Cooper wrote these letters, in the first instance, himself—"just as he talked." When other duties pressed too hard, he located a letter expert who could talk with him for a short time, discuss an idea, and then put Mr. Cooper's personality on paper, writing a letter which not only sounded like Mr. Cooper, but was Mr. Cooper.

The following might be described as of the energizing type. The postscript begins an annual task Mr. Cooper puts on letters—stimulating end-of-the-year orders. This letter, like other letters, went under 2-cent postage. It was multigraphed, with the name and address filled in.

"Dear Mr. Brown:

"I 'knocked off' last Saturday and went to a football game. Had a whale of a time, lost my voice from yelling like a Comanche and otherwise acted like a school boy. But I got a big merchandising idea and I decided that the first order of business this week would be to put it to work—and pass it on to you fellows for what it's worth.

"As I sat there watching those young 'wild' men tearing into each other I asked myself how many games a group of business men would win if they played football as they 'play' business. And I decided that compared to those huskies on the field, we business men were an awful bunch of pikers and that OUR methods wouldn't win a football game in a million years.

"Talk about 'hard times' and 'resistance,' I'll tell the world that the opposing line in a football scramble is the REAL thing. But what do the boys with the ball do? Wait until 'times get better,' until there's less 'sales resistance' to overcome, before they 'play the game'? Not on your tintage! They HIT the line, not once but time after time with every ounce they've got, and

if they can't get through at one place they try another! If straight driving energy won't do they try every trick the coach knows! They KEEP on trying, every bloomin' second!

"What a lesson for merchandisers! Wouldn't the old cash register sing a long sweet song if we business men had a tenth part of the aggressiveness of the football squad? Come on, let's buck the line!

"There isn't any REAL resistance in a country that has hundreds of millions of dollars to loan Uncle Sam at 4½ per cent. Great ham and eggs, the money is there! What in Sam Hill ails us fellows who have electrical merchandise to sell? Can't we show the dear public that modern electrical stuff will pay several times 4½ per cent in comfort, convenience, pleasure, etc.? Sure we can! We've got the punch! But for the love of Andy Gump let's PROVE to somebody that we DO have it.

"Cordially,

"JOHN J. COOPER."

"P. S.—Between Dec. 10 and 20 each year we get telegrams and long distance pleas for 'hurry up' shipments until 1623 Glenarm is a regular madhouse. However, we've most always come through 100 per cent, but if you'll order your Holiday Goods NOW, there'll be no chance for disappointment, and we'll both be mighty happy Christmas morning."

A great many of the letters the Mountain Electric Company sends out begin with some human interest incident. One letter early last fall began by telling of a sales letter just used by a Denver firm which had contained a check for 3 cents, for the purpose, as the letter said, "of paying for the few minutes time it takes to read this letter."

"Just compare that 3 CENTS," remarked Mr. Cooper in his letter, "with the DOLLARS (and a lot of 'em, too) that came to YOU through the mail about two weeks ago in the form of the new Hotpoint price list. It carried 37 prices in red ink, meaning REDUCED PRICES in the majority of cases, the balance being NEW, easy selling appliances."

"Why, gosh darn it, there's no comparison between the pennies those guys got and the dollars you got on these reductions."

An everyday little incident, full of color and applicability, caught for a sales letter, "put it over." There is a lesson here for the dealer getting up sales letters for consumers—a human little incident is big with value anywhere. The incident in the following case helped to hammer home the turnover principle.

"Somebody said to me the other day: 'I don't see how in the world the Scholtz-Mutual Drug Stores can buy the great wads of advertising space they do, sell on a small margin and still keep in business.'

"Well, I wasn't any too sure myself and rather than hazard a lot of wild guesses, I decided to keep still, do a lot of thinking, and see if I could dig up the formula.

"I didn't have such a job at that. My Sunday paper contained a full page Scholtz-Mutual ad and at the top in big headlines was something like this:

'Eighty-nine per cent of our merchandise is fresh every nine days!'

"Holy Mackerel! What a university course that is on the big subject of 'turnover.' Three hundred and sixty-five days divided by nine gives FORTY turnovers a year that they can get on 89 per cent of the stuff they sell. No wonder they can make money. Why, even 4 per cent net per turnover would give them 160 per cent profit per year on their investment.

"How do they get that volume of business, eh? Please notice the next Scholtz-Mutual ad, and you'll see that they spend lots of their own money pushing goods that are widely advertised by the MANUFACTURERS.

"They 'tie into' the nationally created demand with their own sales effort. They don't seem to worry about the big question of 'long margins vs. small margins' at all. All Scholtz-Mutual asks is that the article be in DEMAND—to hang with margins if there is DEMAND for the article. Why, they even go and CUT the heart out of the margins that the manufacturers thought they ought to have.

"Now, do you see what I've been driving at when I've been dinging away at you to forget long margins on UNKNOWN lines of electrical appliances and PUSH a good KNOWN line like BLANK SERVANTS that carries a good honest margin of profit?

"Three Blank sales per week at 30 per cent per sale, leaves you a lot better off than one sale on the unknown, even if the unknown carries 45 per cent. What say? Sure! But how are you fixed on stuff you'll need for Xmas trade?

"Are you going to order it NOW and have it when the sale comes in, or are

you going to hope that WE have more faith in YOUR customers than you have and that WE'LL order it and keep it in stock until you NEED it? We'll go as far as our capital will permit, but we don't have the capital to stock all the appliances that will be bought this Xmas in the Rocky Mountain States.

"Cordially,

"JOHN J. COOPER."

Mr. Cooper on one occasion sent out a two-page letter, but he did not try the experiment again, deciding that a single page was all that he could expect most dealers to read.

From the two letters quoted, the reader will be able to understand that Mountain Electric Company letters get read. One fact ought to be emphasized again, and that is that these vigorous, outspoken letters reflect accurately the personality of the man who signs them—Mr. Cooper. They "fit" him. Sent out in the name of a different jobber, they would assume a quite different aspect.

This direct advertising plan of the Mountain Electric Company has been successful. In particular, the "plan" feature should be heeded—the drafting of a year's effort in advance.

The Square D Company, Detroit, Mich., has recently placed on the market a new convenience outlet, which in addition to presenting a pleasing appearance embodies several unique features. In the outlet the terminal and four jaws are made of one piece of metal thus eliminating connecting screws and poor contacts. No sealing wax is needed in the outlet as all current carrying parts are enclosed by the two pieces of porcelain.

One-act Play Gives Advice to Electrical Salesmen

As a hint to electrical salesmen who are anxious to give their customers better service, the National X-Ray Reflector Company has recently printed a farcical "tragedy" entitled "And So the Day Is Ruined." The purpose of the one-act play is to encourage salesmen to make their orders out in a better manner that needless delays may be averted.

The lines of the play are as follows:

Scene I

Any salesman's office.
(Bill, tearing open telegram about delivery of the big 'Whoosis' order):

? !!!!! * ..D.\$? ,rr% ! ! ! I can't see why'n' x? ! subtn * ..!%, might as well quit tak'n orders. D.... (?). 'n here I got this whopper for Whata MacCallem's,.....gotta have service that's all!

(Grabs paper and scribbles what ought, to be done with service department. Hurries out—mails letter with this new order Special Delivery.)

Scene II

Main Office. Everyone full of pep and at their desks before 8:15 a.m.

(Sales manager looking over mail. Usual Morning smile. Watch it dwindle when he reads Bill's letter.)

"Oh, Les'. What's the reason you can't ship this Whoosis order?"

Les': "Why, the order came in without any information at all and we had to wait three weeks before we got enough details to even write it up."

S. M.: "See if you can't crowd things to give Bill a better promise."

(Resumes looking over mail. Smile returns when he sees raft of orders.)

Bill's order is on top. It's Incomplete like others. . . . What 'n—look at the IMP "Finish to follow" jump out from this order. IMP from second order with "No dimensions" joins him while third and fourth IMPs "No suspension" and "Details to follow" with an army of other procrastinators jump out and, —, —, —.

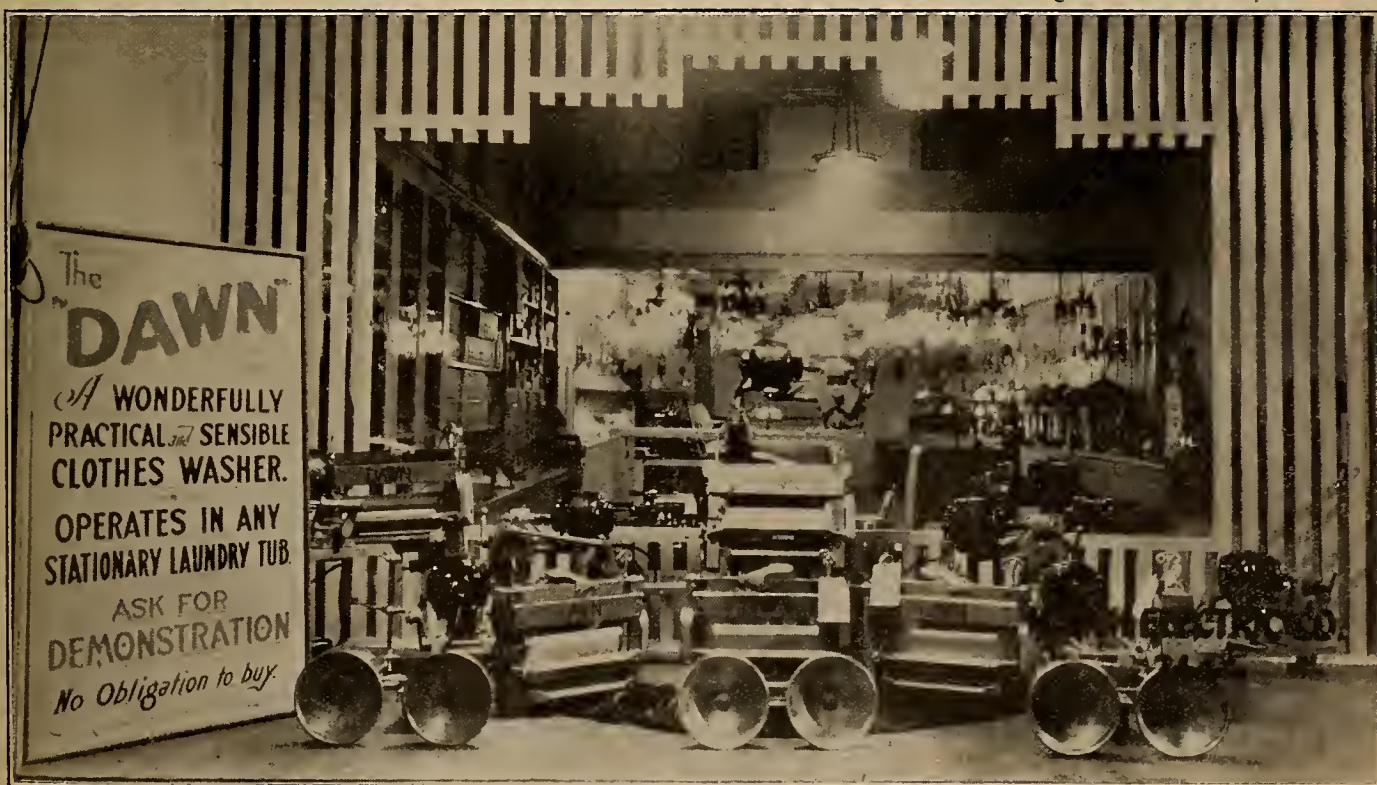
And when YOU want YOUR order

**D Q—and you don't get it—

YOUR day will be Ruined

unless—

Alright. That's fine. We'll all try to help!



Lack of window space has usually kept electrical merchants from displaying more than one or two electric washers at one time. Many times decorators have been anxious to place more than this number in the window, feeling that a greater number would attract more people, but the size of the washers has prevented this. The L. B. Marsh Electric Company of Long Beach, Calif., was recently able to present a unique display by using small washing machines in its window. Eight complete machines may be seen in the display which was presented by it.

INDUSTRIAL NEWS



P. G. & E. to Start Construction on Pit No. 3 in Thirty Days

The construction of Pit No. 3, the second of a chain of power houses which will ultimately develop over 600,000 hp. from the waters of the Pit River in northern California, will start within the next thirty days, according to an announcement made by John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company. The plant will have a capacity of three 27,000-kva. units and will be completed by the fall of 1925. The development will involve the expenditure of approximately \$17,000,000.

Pit No. 3 will be located about 16 miles below Pit No. 1 power house. Installation will involve the construction of a diversion dam 125 ft. high at a point $2\frac{1}{2}$ miles below Peck's bridge on the highway between Burney and Bartle. From this point a tunnel, approximately 22,700 ft. in length, having a capacity of 3,000 cu. ft. per second, will carry the water to a point above the site of the power house. The plant will operate under a static head of 313 ft.

The initial step in the development will be the construction of an extension of the Pit River railroad. The line will branch at Cayton Valley and will follow the river in a southwesterly direction a distance of five miles to the damsite. The road will then extend five miles farther to the site of the power house. A gravity road will lower the material to the construction camp at the damsite.

Before work on the permanent dam is started a temporary diversion dam and tunnel will be constructed in order to facilitate construction work. The driving of the four-mile tunnel will start immediately. The installation will also require the construction of eight miles or more of double circuit, 220-kv. transmission line from power house No. 3 to the main transmission line.

In connection with the announcement relative to this latest step in hydroelectric development, Vice-President Britton stated:

"The company, in its electric service side, is growing at a rate of 20,000 to 25,000 kw. a year of 'peak.' Our engineers calculate that the demands for electric energy increase at the rate of $7\frac{1}{2}$ per cent per annum, or an increase in kilowatt-hour requirements of 120,000,000 kw-hr. a year. Now, it was a pleasure to record the opening of Pit No. 1 plant last fall, but this, despite the fact that it may be expected to contribute nearly one million kilowatt-hours per day to our electric distributing system, did little more than fill the gap between supply and demand that had been occasioned by a slackening in

construction work during the period of financial depression preceding the war and, of course, during the war period itself. We expect to complete Pit No. 3 by the fall of 1925 by which time, according to our calculations, the demands upon us for electric energy will have increased between 350,000,000 and 400,000,000 kw-hr."

Members of Engineering Council of Utah Elect Officers

At a meeting of the Engineering Council of Utah, held at Salt Lake City on March 3, the following officers were elected to serve for the ensuing year: president, Dr. Joseph F. Merrill, director, School of Mines and Engineering, University of Utah, and past chairman of the Utah Section, American Institute of Electrical Engineers; vice-president, W. E. Hare, architect, past chairman, Utah Section American Institute of Architects; and secretary-treasurer, Howard C. Means, state road engineer, and chairman Utah Section American Society of Civil Engineers.

The Engineering Council of Utah is an affiliation of all Utah engineering societies, and represents about fifteen hundred men of the engineering profession. This is the largest body of organized technically trained men in the state of Utah.

City of Seattle Will Build 100 Mile Transmission Line

Bids for the construction of 100 miles of 165,000-volt transmission line and telephone line from the Gorge Creek plant on the Skagit River development of the City of Seattle will be called for April 13, according to C. W. Uhden, chief engineer of the project. Specifications will be completed by March 30 and will be on file in the office of the chief engineer, 1400 Alaska Bldg., Seattle.

The line will bring power from the Gorge Creek plant, the first unit of Seattle's municipal development program on the Skagit River, to a substation outside the city. The plant, which will have an initial capacity of 34,500 kw., will be completed late in 1923 and it is planned to have the transmission line ready for operation at the same time.

The factory which the General Electric Company has erected at Oakland, California, was put in operation March 1, and is being used primarily for repair and service work and the assembly of switchboards. It is the intention later to undertake the manufacture of distribution transformers.

Underwriters Will Open Testing Laboratory in West

A Pacific Coast testing laboratory similar to those already established in New York and Chicago will be opened in San Francisco about April 1 by the Underwriters' Laboratories, Inc., according to an announcement made by A. R. Small, vice-president of the organization, at a meeting of San Francisco Electrical Development League on March 12, 1923.

Mr. Small's visit to the Pacific Coast, together with the announcement of the establishment of the Pacific Coast laboratory, marks the culmination of a wave of sentiment that had its inception previous to the World War. So important has the electrical industry become on the Pacific Coast that it was felt that western manufacturers who desired to have their products passed by the Underwriters' Laboratories should not be compelled to undergo the expense and time involved in sending specimens to Chicago.

The laboratory will be installed at 615 Commercial Street. It will contain the latest equipment for testing electrical devices, appliances and materials, and will be on a par with the New York establishment of the company. R. J. Larrabee, resident electrical engineer for the company, will be in charge of the staff of experts to be employed at the laboratory. Charles Lum will act as district agent for the organization with headquarters in San Francisco.

The Colorado Power Company, Denver, Colo., will provide electrical energy for driving the Moffat tunnel through six miles of granite underlying the Continental Divide in western Colorado, according to announcement just made in Denver. The Moffat Tunnel Commission, a state body, has just awarded the contract. The Colorado Power Company will extend a line 30 miles to the portal of the tunnel. The expense of the line will be borne by the state, it is understood. It is estimated that the tunnel proper, which will be preceded by a pioneer, or working tunnel, will require three years of labor before it pierces the range, through which coast-to-coast trains will be routed.

The United States Reclamation Service is offering for sale to the highest bidder two canals located in the Klamath Reclamation District in northern California and southern Oregon, near Klamath Falls, Ore. The canals are known as the Ankeny and Keno Canals, and bids will be received on April 25. Full details concerning the sale appear in the "Searchlight Section" of this issue.

Work on Moccasin Creek Plant Progressing Rapidly

Construction work is progressing rapidly at the site of the Moccasin Creek power house on the Hetch Hetchy and city officials of San Francisco now estimate that the plant will be in operation before the middle of 1924. On March 2, 1923, approximately 1,680 ft. of the 5,000-ft. tunnel from the forebay reservoir to the top of the penstocks had been driven while more than 16 miles of the 18.3-mile tunnel from Intake to Priest had been completed. This tunnel will be completed in four months. Excavation for the four penstock lines is completed, excavation for the power house is under way and the contracts for the structural steel and both electrical and hydraulic equipment have been let. All power equipment is to be delivered before Aug. 31, 1923.

The power house structure as now being built will be 225 x 70 ft. in plan with provision for the addition of 75 ft. in length to accommodate additional units to be installed later. Four generating units are going in under the present contract. These will include four 20,000-kva., 257 r.p.m., 3-phase, 11,000-volt generators driven by double overhung impulse wheels rated at 25,000 hp. and operating under effective heads of 1,250 ft.

Where the penstocks enter the power house structure the flow will be controlled by eight 36-in. gate valves operated by hydraulic power. The power house equipment includes an overhead crane with a span of 50 ft. and a capacity of 135 tons.

The distance from the Moccasin Creek power house to San Francisco is 135 miles and survey crews are now in the field making final location for the double-circuit steel tower line which will be completed and ready for service before the power house is finished.

For the mountain and valley section of the transmission line a total of 525 miles of steel core aluminum cable has been ordered. This will have a cross-

section of 389,000 circ. mils, the equivalent of 250,000 copper circ. mils. For the San Francisco Bay division of the transmission line order has been placed for 177 miles of hemp core copper conductor with an area of 345,000 circ. mils.

Transformers and switching equipment at the new power house will be of the outdoor type. Thirteen 6,667-kw. single-phase transformers will take the current at 11,000 volts, delta connected, and deliver it at 115,000 or 154,000 volts star connected. Both oil and air break switches will be provided, designed to operate 154,000 volts, which will be the tension for which insulators and other transmission equipment will be provided.

The Hetch Hetchy dam on the Tuolumne River is practically complete. The dam rises 226.5 ft. above the stream bed with the base of its foundations 118 ft. below. Ultimate plans call for the addition of 85.5 ft. to the dam.

The Reed power bill, now before the Washington Legislature, and which gives cities authority to sell surplus power outside their limits, has been passed by the House, and has been passed by the public utilities committee of the Senate, and returned with three amendments, as follows: that cities be given authority to sell surplus power, under jurisdiction of the Department of Public Works; that cities pay an annual license fee equal to 5 per cent of the yearly gross receipts from the sale of such power; that one-half of the revenue so obtained go to counties where plants and transmission lines are found; and that the measure be submitted to the people in 1924.

Work on construction of the proposed Kettle Falls plant of the Washington Water Power Company of Spokane, Wash., will be started as soon as possible, and will have the first generating unit in operation in the summer of 1925, company officials announce.

Committees for Ogden Engineers Are Named by Directors

At the meeting of the Ogden, Utah, chapter of the American Association of Engineers, held on Feb. 9, Herman J. Craven, the new president, was formally installed, together with the new directors.

The new president announced the following committees which have been named by the directors:

Qualifications, O. C. Lockhart, chairman; W. S. Craven, M. D. Williams, Ora Bundy and R. H. Whitmeyer; membership, John Brown chairman, K. C. Wright, Glen Maw and H. M. Shank; legislative and ethics, E. E. Kidder, chairman, H. S. Irwin and J. M. Tracy; nominating, L. E. Peterson, chairman, W. S. Craven, R. Pearson, B. W. Matteson and J. L. Scudder; publicity, C. W. Cross, chairman, J. C. Brown, L. E. Peterson, Ora Bundy, W. S. Craven; industrial, R. E. Bristol and L. W. Beeson; education, R. H. Shoemaker, chairman, A. K. Andrews; employment, K. B. Campbell and A. W. Grix; greet-ers, Ora Bundy, C. A. Lund, M. D. Williams and B. W. Matteson; entertainment, J. C. Brown, chairman, Ernest Gilgen and A. W. Grix.

Campaign Budget Requirements for 1923 Are Discussed

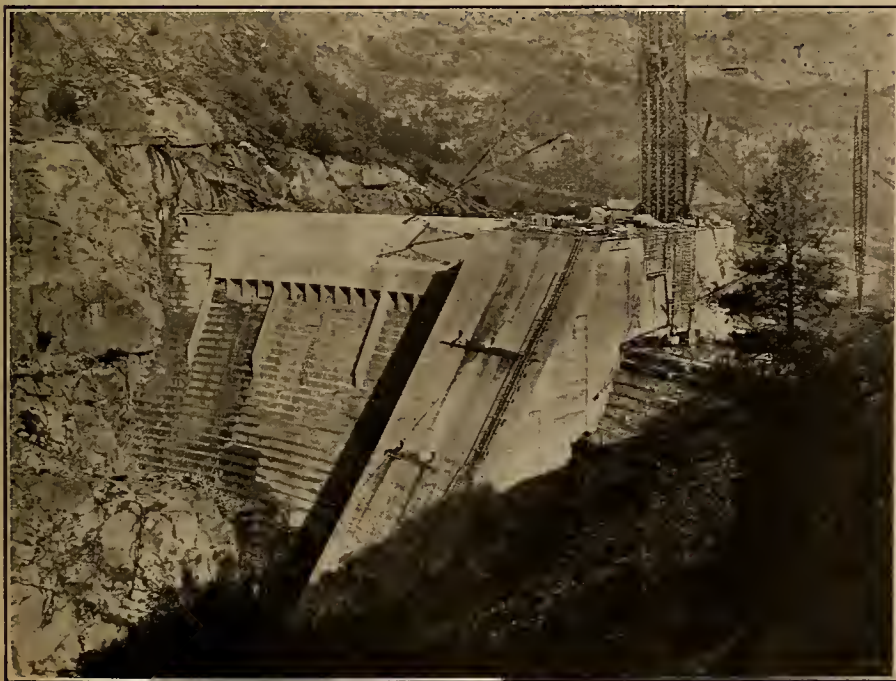
Budget requirements to meet the enlarged program of activities for the current year were discussed at the meeting of the Advisory Committee of the California Electrical Cooperative Campaign held in Los Angeles March 5, 1923. The tentative budget as adopted by the committee follows:

| | |
|--|-----------------|
| Salaries of seven field representatives..... | \$20,700 |
| Traveling expense of field representatives | 6,000 |
| Executive expense | 6,000 |
| Office rent—San Francisco and Los Angeles | 2,400 |
| Office salaries—San Francisco and Los Angeles | 3,600 |
| Stationery, printing and postage..... | 500 |
| Advertising and publicity..... | 5,000 |
| Telephone and telegraph..... | 500 |
| Five illuminated billboards..... | 3,000 |
| Transportation of exhibits and exhibit expense | 2,500 |
| | \$50,200 |

Three field representatives are to be employed, together with a stenographer, to be located in the Los Angeles office of the Campaign. The budget estimate is based upon the experience of the past year and is sufficiently flexible to include seasonal advertising campaigns of state-wide interest, such as a Christmas campaign and June Bride Week activity.

Plans for June Bride Week, which was one of the outstanding activities of the Campaign during the past year, are already under way and a definite announcement of the program to be followed this year will be forthcoming following the next meeting of the Advisory Committee in San Francisco on April 6, 1923.

The new constitution and bylaws of the organization which are in the process of preparation were also tentatively considered. It is the aim of the Advisory Committee to have these ready for distribution to the members as soon as possible.



View of the downstream face of the Hetch Hetchy Dam, which is practically complete. Plans call for the completion of Moccasin Creek power house, a part of this project, within eighteen months.

Transmission Line to Be Built Over Sierra Nevadas

An agreement between the Pacific Gas & Electric Company and the Truckee River Electric Company for the construction of a transmission line over the Sierra Nevada Mountains has recently been reached, according to E. W. Florence, manager of the Sacramento division of the Pacific Gas & Electric Company. The Truckee Electric Company serves a mining load in the Comstock district and the revival of mining there has greatly increased the demands on the company.

To meet this increased demand arrangements have been made for the Pacific Gas & Electric Company to supply additional power to the Nevada company. A line will be constructed from Drum Power House on Bear River, near Towle, Calif., over the summit of the Sierra Nevada Mountains and will connect with the lines of the Truckee Electric Company at Verdi, Nev. The construction of the lines over the mountains will have to be of extremely rugged nature because of the heavy snows in the region, the snow often reaching a depth of from five to twenty ft. The lines of the Truckee company will have to be increased in size in order to care for the larger load that will be handled by the company. The Truckee Electric Company now serves the cities of Reno, Carson, and Virginia City and the surrounding territory.

Committees Appointed to Aid in Arranging Radio Show

Members of the San Francisco Electrical Development League recently received definite confirmation from the American Radio Exposition Company, Inc., of New York, that the Radio and Electrical Exposition planned for the Pacific Coast, would be held in the Civic Auditorium in San Francisco. J. C. Johnson, the San Francisco representative of the organization, addressed the members of the league and stated that his company had decided that San Francisco was the most suitable place for the exposition because of its central location. He claimed that the exposition would surpass anything of its kind ever attempted by the electrical industry in the West.

An advisory committee was appointed following the luncheon meeting and the members will aid the exposition company in establishing the show. Mr. Johnson was made chairman of the committee. This committee will advise the exposition managers of the feelings of the San Francisco Electrical Development League and similar societies.

The personnel of the San Francisco advisory committee includes Louis F. Leurey, president of the San Francisco Electrical Development League; J. Mahoney, secretary and treasurer of the San Francisco Electrical Development League; H. C. Hopkins, president of the Pacific Radio Trade Association; R. E. Fisher, Pacific Gas & Electric Company; Earl Browne, president California State Association of Electrical Contractors and Dealers; O. H. Miller, vice-president, Pacific Radio Trade Association; Victor Lemoge, president, San Francisco Association of Electrical Contractors and Dealers; A. E. Rowe, Garnett Young Company; Max Lowenthal, secretary and treasurer, Pacific

Radio Trade Association; R. D. Oyler, treasurer, California State Association of Contractors and Dealers; A. H. Halloran, "Radio Magazine"; E. Martin, vice-president, San Francisco Association of Electrical Contractors and Dealers; J. W. Redpath, secretary, California State Association of Electrical Contractors and Dealers; C. L. Chamblin, California Electrical Construction Company; and A. Elkins, secretary, San Francisco Association of Electrical Contractors and Dealers.

A committee has also been appointed by the league to handle the league's activities in connection with the exposition which will be held the week of April 3. Members of this committee are: A. E. Rowe, Garnett Young Company, chairman; C. L. Chamblin, California Electrical Construction Company; M. W. Scanlon, Westinghouse Electric & Manufacturing Company; V. W. Hartley, California Electrical Co-operative Campaign; N. S. Gallison, "Journal of Electricity and Western Industry"; and Arthur Dahl, C. W. Dahl & Son.

Extensive improvements amounting to \$175,000 in transmission line and generating equipment is about to be made by the Mountain States Power Company, as announced by C. M. Brewer, vice-president and general manager of the company. These betterments are needed to care for rapidly increasing load on the system and to insure service in case of failure of the new Copco high line. The auxiliary power plant at Albany will be enlarged at a cost of \$75,000. A 60,000-volt line will be built from Albany to Independence at a cost of \$60,000. Insulators on the 60,000-volt line between Springfield and Albany are to be entirely replaced with larger units and will cost \$40,000 when completed. This last named improvement is well under way.

The Northwestern Electric Company of Portland, Ore., is installing a new \$50,000 substation at Vancouver, Wash. The company plans to spend in the neighborhood of \$75,000 in bringing a 66,000-volt transmission line from Camas, Wash., to Vancouver.

Power Development Plans Given Approval by Commission

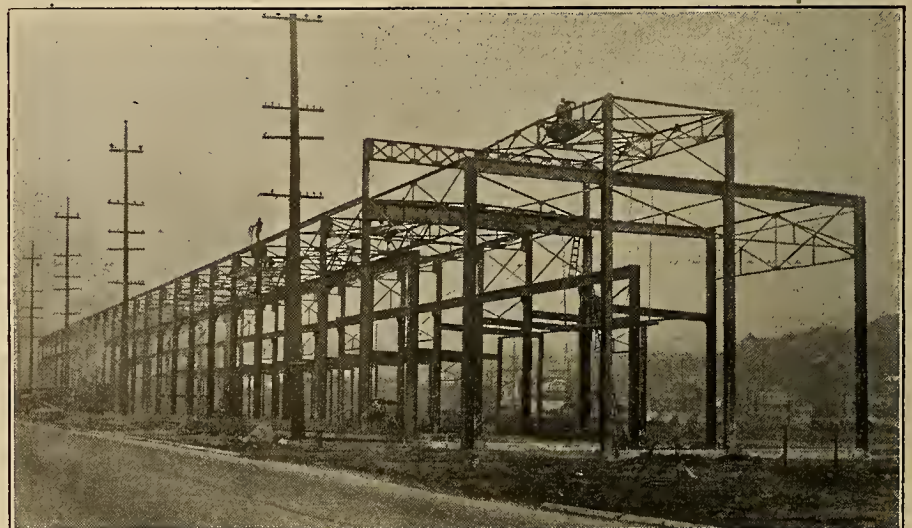
Approval has been given the hydroelectric development plans of Lars Jorgensen of San Francisco, by the Federal Power Commission at Washington, D. C. It is the purpose of the Middle Fork Development Company, for which Mr. Jorgensen is chief engineer, to develop approximately 350,000 hp. of electrical energy.

The federal permit gives the company the right to construct an impounding reservoir on the Middle Fork of the Feather River. The company has plans to erect six hydroelectric plants, with a generating capacity of 201,000 hp., and eventually 350,000 hp. Three reservoirs are also planned.

The initial work will be done at Bear Creek, a few miles from Oroville, Calif., near Berry Creek station on the Western Pacific railroad. A power plant capable of developing 48,000 hp. will be constructed there at a cost of about \$5,000,000. According to Mr. Jorgensen, work will be started in the spring of 1924.

The British Columbia Electric Railway Company has sold its interest in the railway from Port Moody to Coquitlam Lake, a standard gage line, eight miles long, to Thurston & Flavelle, of Port Moody. The railway was built during the construction of the Coquitlam dam for the joint use of the British Columbia Electric and the McNair Lumber Company, the former using it to take supplies to the dam and the latter to bring logs out. The McNair company's interest in the line subsequently was leased to the Canadian Robert Dollar Company, which now has relinquished its lease to Thurston & Flavelle. The consideration received by the British Columbia Electric was \$50,000.

Immediate construction of the plant of the Columbia Steel Corporation has been ordered. The blast furnace and coke oven plant to be built will be located between Provo and Springville, Utah. The company hopes to be producing pig iron by March, 1924.



First unit of three major ones to be constructed by the Washington Iron Works, of Seattle, Wash., to be used by the company in manufacturing logging equipment, hoisting engines, boilers, tanks, and iron and steel castings. The first unit will be used as a boiler shop. Electricity will play an important part in the driving mechanism which will be installed in the entire plant. The plant will cost in the neighborhood of \$1,000,000 when completed.

Great Western Power Plans Third Unit in Caribou Plant

Plans for the immediate installation of a third unit of 22,000-kw. capacity in the Caribou plant on the North Fork of the Feather River have been announced by J. B. Black, general manager of the Great Western Power Company of California. The addition to the generating capacity of the company will entail the expenditure of approximately \$1,500,000.

Surveying parties are already in the field and preliminary engineering work under way. Bids for hydraulic and electrical equipment will be called for within the next 15-30 days. The installation will include penstock, turbine, generator, exciter, transformers and other electrical equipment. Tunnels and transmission lines are already completed.

Increased load demands constitute the reason for the enlargement of the plant. At the present rate of growth the added power will be required within a year and it is expected that the installation will be completed within that time.

The present Caribou plant was placed in operation in the summer of 1921. The equipment includes two 30,000-hp. double overhung impulse wheels operating under a head of 1,008 ft., and two 11,000-volt, 22,223-kva. generators. The ultimate capacity of the plant is six such units.

Reports for Convention Will Be Selected at Meeting

Reports which are to be presented at the annual convention of the Pacific Coast Electrical Association in San Francisco, June 19-22, 1923, will receive final consideration at a meeting of the Technical Committee of the organization to be held at Hotel Fresno, Fresno, Calif., March 20-22, 1923. In addition to the general committee report there will be the reports of the following sub-committees: Apparatus, Hydraulic Power, Inductive Interference, Meter, Overhead Systems, Prime Movers, Power Factor, Safety Rules and Underground Systems.

The Technical Committee is composed of the following: L. J. Moore, San Joaquin Light & Power Corporation, Fresno, chairman; H. L. Doolittle, Southern California Edison Company, Los Angeles, vice-chairman; C. E. Schnell, San Joaquin Light & Power Corporation, Fresno, secretary; P. O. Crawford, California Oregon Power Company, Medford, F. O. Dolson, Southern Sierras Power Company, Riverside, E. N. D'Oyly, Western States Gas & Electric Company, Stockton, C. A. Heinze, Bureau of Power and Light, Los Angeles, Lloyd Henley, California State Railroad Commission, San Francisco, J. P. Jollyman, Pacific Gas & Electric Company, San Francisco, S. J. Lisberger, Pacific Gas & Electric Company, San Francisco, W. P. L'Hommedieu, Westinghouse Electric & Manufacturing Company, San Francisco, R. S. Masson, Arizona Power Company, Prescott, H. Michener, Southern California Edison Company, Los Angeles, R. C. Powell, Pacific Gas & Electric Company, San Francisco, T. W. Snell, Coast Valleys Gas & Electric Company, Salinas, E. R. Stauffacher, Southern California Edison Company, Los Angeles, E. E. Valk,

General Electric Company, Los Angeles, W. R. Van Bokelen, Coast Counties Gas & Electric Company, San Francisco, P. M. Wentworth, Truckee River General Electric Company, Reno.

Chairmen of the various subcommittees follow:

Apparatus, R. H. Halpenny, Southern Sierras Power Company, Riverside; Hydraulic Power, H. L. Doolittle, Southern California Edison Company, Los Angeles; Inductive Interference, J. E. Woodbridge, Ford, Bacon & Davis, San Francisco; Meter, W. H. Talbott, San Diego Consolidated Gas & Electric Company, San Diego; Overhead Systems, J. A. Koontz, Great Western Power Company, San Francisco; Prime Movers, E. A. Quinn, San Joaquin Light & Power Corporation, Fresno; Power Factor, R. C. Powell, Pacific Gas & Electric Company, San Francisco; Safety Rules, R. R. Cowles, Pacific Gas & Electric Company, Oakland; Underground Systems, E. R. Northmore, Los Angeles Gas & Electric Company, Los Angeles.

Plans have recently been announced which call for the erection of a market terminal for the wholesale fruit and produce business of San Francisco. The buildings to house the wholesale markets will cost in the neighborhood of \$500,000 and the entire project will entail an expenditure of approximately \$2,000,000. The market will have access to both rail and deep water transportation facilities and it is expected that nearly \$1,000,000 cartage charges will be saved when the new site is completed.

The public utilities commission of Utah has issued an order approving an adjustment contract made between the Utah Power & Light Company and the Salt Lake Pressed Brick Company, covering electric service rendered the latter company. The former contract between the two companies was in question during the long-continued special contract and power rate cases heard before the commission over a period of several months, and decided early in 1921. At that time, however, the commission reserved jurisdiction over several contracts, including that of the Salt Lake Pressed Brick Company, which matter has since been awaiting adjustment.

The Seattle Municipal Railways, on March 1, returned to the 5-cent cash fare, with a charge of 6 1/4 cents where a transfer is required. Street railway officials are confident that the reduced fare will result in largely increased traffic, and D. W. Henderson, superintendent of railways, is prepared to increase the railway service 20 per cent, if the traffic warrants it. The first few days of the 5-cent fare showed a material increase in riders, especially on the short-haul lines. Fares on the municipal buses operated in connection with the street railway system, have also been reduced from 10 cents to 5 cents, with transfer privileges.

The Pacific Telephone and Telegraph Company has acquired property located at Fourth and Court Streets at The Dalles, Ore., for the construction of a new home for the Wasco County plant. This will be a one-story building of the most modern type.

Petitions Filed for Power and Transmission Projects

Two applications for transmission line licenses in the western states were received by the Federal Power Commission in the second two-weeks' period in February. The Southern California Edison Company has applied for a license for a branch of its 220,000-volt line from the power houses in the headwaters of the San Joaquin River, to Los Angeles. The branch leads from this line to the Laguna-Bell substation in the outskirts of Los Angeles. A short transmission line from the connection with the system of the Middle Yuba Hydroelectric Company to the Brush Creek mine of the Ante Up Mining Company in Sierra County, California, is the subject of an application filed by the mining company.

A petition for a preliminary permit for two projects has been filed by G. Henry Stetson. The first project contemplates the construction of a rock-fill dam 70 ft. high at Bulls Head Rock, in the Colorado River near the southern point of Nevada, at which point it is proposed to develop 168,000 hp. Power from this first project will be used in constructing the second one, which will be located at Boulder Canyon. There a rock-fill dam 1,064 ft. above the present water level is contemplated. This dam would impound 155,000,000 acre-feet of water. The applicant proposes to develop 1,600,000 hp. to be marketed in the Southwest.

The commission recently granted a six-months' extension of time to James B. Girard, of New York, on his application to erect on the Colorado River a 200,000-hp. hydroelectric plant at Diamond Creek, Ariz. The extension was made pending disposal of legal complications as to jurisdiction on the river.

Pacific Gas & Electric Company Buys Control of Utility

Control of the properties of the California Telephone & Light Company of Santa Rosa, Calif., a \$10,000,000 utility supplying electric power, light and telephone service to consumers in Napa, Sonoma, Lake and Mendocino counties, has been acquired by the Pacific Gas & Electric Company of San Francisco. The transaction does not involve the exchange of cash but is based on the transfer of stock from the Pacific Gas & Electric Company to stockholders of the smaller utility. The purchase of the company must receive the sanction of the California State Railroad Commission.

The California Telephone & Light Company owns and operates electric light and power distribution systems and telephone circuits in a rich and partially developed section north of San Francisco Bay, which includes, among other communities, Sonoma, Calistoga, Healdsburg, Cloverdale and Lakeport. It has no generating facilities, purchasing all of its power wholesale from the Pacific Gas & Electric Company and the Snow Mountain Power Company.

The company was organized in 1911, taking over the property formerly belonging to the Sonoma Valley Light & Power Company, Russian River Light & Power Company, Clearlake Consoli-

dated Telephone & Telegraph Company, Northwestern Electric Company, Healdsburg Telephone Company, Northwestern Telephone & Telegraph Company, and the Gold Ridge Improvement Company. Later it acquired the Cloverdale Light & Power Company and the Mt. Konocti Light & Power Company.

The officers of the company are Leonard Howarth, president; F. P. Doyle, vice-president; Leo H. Sussman, second vice-president; W. P. Ferguson, secretary-treasurer and general manager, and A. J. Lyon, assistant secretary and auditor.

The consolidation will add to the lines of the Pacific Gas & Electric Company a total of 9,000 consumers, 2,400 of whom are telephone subscribers. It will not only offer a large, new and hitherto only partially developed outlet to this company, but with the greater resources and progressive policies of the larger utility, the consolidation should mean much for the future development of the territory involved.

Demand for New Water Rights in California Is Heavy

Twenty-five applications for permits to appropriate water in the state of California were received by the State Department of Public Works, Division of Water Rights, during February. Most of the applications were for water to be used for agricultural purposes. Several applications requested water for use in mining operations.

H. L. Shannon of San Francisco, made application for a permit to appropriate 150 sec.-ft. of water from the Sacramento River in Tehama County. Mr. Shannon proposed to use the water in developing approximately 10,200 hp. of electrical energy. A ditch and flume ten miles in length is also contemplated, the estimated cost of the entire project being \$650,000.

A request was made by W. H. Samson of Corning, for permit to use 1,250 sec.-ft. and 200,000 acre-feet of water from Clear Creek to be diverted in Shasta County for developing power. The application states that it is proposed to develop 128,000 hp.

During the same month twenty-seven permits were issued to residents of the state for use of water. Only two of this number are of any marked importance as regards the development of hydroelectric power. P. B. Cross, Mills Building, San Francisco, was issued a permit to appropriate water from Deer Creek, in Tehama County, for developing approximately 18,600 hp. The permit gives the right to use 150 sec.-ft. of water from the stream and states that the estimated cost of the development is \$1,669,648.

The Utica Mining Company, Mills Building, San Francisco, was issued a permit to use 6,144 acre-feet of water per year from Highland Creek in Tuolumne and Calaveras counties, in developing about 3,300 hp. The estimated cost of the project is \$150,000.

The town of Chandler, Ariz., is contemplating the installation of an ornamental street lighting system along with a municipal light and power distribution system for which two-phase energy will be purchased. An election will be held soon to allow the citizens of the town to vote on the issuance of bonds.

Lumber Company Water Rights in Shasta County Sold

Through two deeds recently filed in Shasta County, California, the Mount Shasta Power Company, a subsidiary of the Pacific Gas & Electric Company, received title from the Red River Lumber Company to all of the water rights on Hat Creek, Fall River and on Pit River from the mouth of Fall River to Big Bend, forty miles below. The cash consideration was \$2,830,000.

Included in the transactions were power houses known as Hat Creek No. 1 and Hat Creek No. 2, which were deeded to the Red River Lumber Company and were leased to the power company in return for 3,500 hp. to be delivered to the lumber company as it may be needed.

Advisory Committee of Campaign Makes Plans for 1923

Plans for the California Electrical Cooperative Campaign for the coming year were explained to a group of the leaders in the electrical industry in southern California at a meeting held at the University Club, Los Angeles, on March 5, 1923. Members of the Advisory Committee were in attendance.

Included among those who addressed the meeting were R. E. Fisher, chairman of the Advisory Committee, K. E. Van Kuran, vice-chairman of the committee, R. E. Eltringham, manager of the Campaign, R. H. Ballard, A. E. Wishon, D. E. Harris, H. L. Harper, H. L. Miller, H. H. Courtright, H. B. Woodhill, and W. C. Wurfel.

Others who were in attendance were H. G. Holabird, D. C. Pence, H. E. Sherman, Jr., C. A. Renard, J. O. Case, A. L. Spring, H. H. Walker, N. W. Graham, J. N. Kelman, R. E. Smith, P. G. Gough, H. W. Allen, W. L. Frost, C. C. Hillis, J. G. Pomeroy, H. M. Pomeroy, S. W. Murray, C. B. Hall, G. C. Tenney, W. A. Knost, J. L. Kline, Ross Hartley, J. C. Jones, P. H. Booth, Frank Weiss, G. E. Arbogast, A. B. Vandercook, R. C. Spillsbury, J. H. Jamison, F. J. Airey, W. R. Dorsberg and E. R. Northmore.

The City of Sacramento, Calif., is considering the organization of a district for the development and distribution of electric energy in connection with the Silver Creek project. It is the purpose of the city manager to interest the people of the city in the erection of a municipally owned hydroelectric plant. The plans made by the city council call for the proceeding under what is known as the Municipal Utility District Act, which permits such districts to incur bonded indebtedness for the acquisition and construction of works and property.

H. Austin Adams was the principal speaker at the last monthly evening meeting of the San Diego Electrical Club, held at the San Diego Hotel, San Diego, Calif. A number of men from the electrical industry who have been unable to attend the noon-day meetings were present at the evening meeting. It is the policy of the club members to bring at least one guest per member to these meetings.



The phases of service and marketing of electricity by the power company were discussed by the Commercial Committee of the Pacific Coast Electrical Association at the meeting held in Fresno, Calif., on Feb. 10. Those attending the meeting were: (top row left to right) J. F. Anderson, Southern California Edison Company; R. I. Carruthers, Southern California Edison Company; M. E. Newlin, San Joaquin Light & Power Corporation; E. M. Westhoven, Southern California Edison Company; (second row from top) J. E. Barrett, San Joaquin Light & Power Corporation; E. N. Britton, San Joaquin Light & Power Corporation; I. P. Maines, Southern California Edison Company; H. C. Rice, Southern California Edison Company; Howard Douglas, Southern California Edison Company; (third row from top) Don C. Ray, Pacific Gas & Electric Company; O. S. Clifford, Truckee River Power Company; J. S. Moulton, San Joaquin Light & Power Corporation; N. S. Eichelberger, San Joaquin Light & Power Corporation; F. O. Sievers, General Electric Company; H. A. Cram, Landers, Frary & Clark; F. S. Hamilton, Southern California Edison Company; (bottom row) H. E. Sandoval, Pacific Gas & Electric Company; A. M. Frost, San Joaquin Light & Power Corporation; P. B. Wilson, San Joaquin Light & Power Corporation; A. H. Nicoll, Western Electric Company; J. W. Wrenn, Great Western Power Company; R. C. Bragg, Vallejo Electric Light & Power Company; and Ernest M. Frellson, Coast Valleys Gas & Electric Company.

Meetings

Pacific Coast Convention Plans to Be Made in April

Plans for the annual convention of the Pacific Coast Electrical Association affiliated with the National Electric Light Association, will be discussed at a meeting of the executive committee of the organization, to be held in Los Angeles during April. The convention will be held in San Francisco June 19-22, 1923. Those comprising the executive committee are J. B. Black, Great Western Power Company, president; L. M. Klauber, San Diego Consolidated Gas & Electric Company, vice-president; William Baurhyte, Los Angeles Gas & Electric Company, vice-president; J. V. Anthony, General Electric Company, treasurer; Samuel H. Taylor, secretary; A. B. West, Southern Sierras Power Company, G. E. Arbogast, Newbery Electric Company, Los Angeles; R. A. Balzari, Westinghouse Electric & Manufacturing Company, San Francisco; S. Waldo Coleman, Coast Counties Gas & Electric Company, San Francisco; E. B. Criddle, Southern Sierras Power Company, Riverside; H. L. Harper, Western Electric Company, Los Angeles; A. N. Kemp, Southern California Edison Company, Los Angeles; F. A. Leach, Jr., Pacific Gas & Electric Company, San Francisco; R. S. Masson, Arizona Power Company, Prescott; H. R. Noack, Pacific States Electric Company, San Francisco; Robert Sibley, consulting editor, McGraw-Hill Company, San Francisco; A. Emory Wishon, San Joaquin Light & Power Corporation, Fresno.

The annual convention of the Northwest Electric Light and Power Association will be held in Seattle June 27-30, 1923. The program for the convention is in the process of preparation and will be announced in the near future. It is planned to make this year's gathering the most noteworthy in the history of the organization. The committee which is in charge of the program follows: Norwood W. Brockett, Puget Sound Power & Light Company, chairman; R. M. Boykin, North Coast Power Company, Portland, L. A. Lewis, Washington Water Power Company, Spokane, George L. Myers, Pacific Power & Light Company, Portland, and George F. Nevins, Pacific Power & Light Company, Portland.

At the seventeenth annual convention of the Oregon Retail Hardware and Implement Dealers' Association, held in Portland, recently, the sale of electric devices by hardware men was given a prominent place in the program. Ray W. Turnbull, northwestern representative of the Edison Electric Appliance Company, devoted an hour to the subject, "Should the Hardware Dealer Sell Electrical Household Appliances?" and his message was well received. The remarkable thing is that this subject has not always been considered of sufficient general interest to justify its presentation at a convention.

As one of his first official acts, J. F. Zwiener, newly elected president of the Electric Club of San Diego, Calif., recently appointed the standing committees for the coming year. The following committeemen were appointed: program, entertainment, fraternal and attendance: Herbert Rose, G. P. Winn, Evan Shaffer; publicity and public education: A. N. Clark, R. H. Taber, C. C. Clardy; electrical development: Bert Johnstone, Carl Heilbron, L. M. Klauber; electrical home: A. E. Holloway, Frank Munro, Bruno Barth, George Garrettson, Walter Wurfel; membership: G. H. P. Dellman, Harold Dodge, Charles Dent; visiting and relief: W. H. Talbot, George Garrettson, A. L. Wilhelm; slogan, emblem and roster: R. C. Cavell, Sam Hall, Frank Carlson; better business methods: A. E. Holloway, Frank Munro, Walter Wurfel.

For the purpose of considering and discussing the uniform classification of accounts for electric utilities as recommended by the National Association of Railway and Utilities Commissioners, a meeting was held in Denver, recently, under the auspices of the Colorado Public Utilities Commission. Representatives of all the leading central stations in the state were present and it is understood that approval was given to the plan insofar as standardization of accounts was concerned.

A large electric sign whose letters make up the phrase, "Have Faith. Smile and Rebuild," which was donated to the citizens of fire swept Astoria, Ore., by a San Francisco sign company, has arrived in the city and will be immediately located in the heart of the burned business district. The sign will be erected under the auspices of the Kiwanis Club, the work to be done free of charge by the linemen of the Pacific Telephone & Telegraph Company, and the electricity will be furnished free for the sign by the Pacific Power & Light Company.

COMING EVENTS

- American Society of Mechanical Engineers—
Pac. Coast Regional Meeting—Los Angeles, Calif.
Apr. 16-18, 1923
- National Electric Light Association—
Annual Convention—New York, N. Y.
June 4-8, 1923
- Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923
- American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Sept. 26-29, 1923

The Northwestern Redwood Company was recently authorized by the California Railroad Commission to sell its electric distributing system located in Willits, Calif., to the Willits Water & Power Company for \$23,500 plus the cost of additions and betterments installed since Nov. 1, 1922. The Willits Water & Power Company was also authorized to acquire the property and to sell it, together with its water properties, to the Central Mendocino County Power Company for \$90,000 plus the cost of additions and betterments installed since the same date.

Los Angeles Club Sees Portable Show Window Display

The Electric Club of Los Angeles celebrated Merchants' Day on Feb. 26, and at that time witnessed the portable window display designed by the California Electrical Cooperative Campaign. The display window was equipped and decorated by Barker Brothers, furniture house, and Clark Baker demonstrated the window. Robert Eltringham, manager of the Campaign, discussed the application of modern illumination to stores and show windows.

To enable the large crowd, in attendance at the meeting, to hear the speakers plainly, Western Electric public address system was installed in the ball room of the Hotel Alexandria. This system was first successfully tried out in Los Angeles at the Chamber of Commerce banquet. The new device proved to be very interesting to the men assembled at the meeting.

The February joint meeting of the Portland sections of the American Institute of Electrical Engineers and National Electric Light Association was held Feb. 20 in the employees' club room of the Pacific Telephone & Telegraph Company. As the guests of the telephone company the large audience was first told various phases of the tremendous job completed on Jan. 27, when the company in a single night cut over 12,000 subscribers from manual to machine switching stations. Afterwards, under the guidance of a corps of able telephone men the guests were divided into groups and escorted through all departments of the big telephone building, where they were given opportunity to see a big exchange in operation.

As evidence of its good will and interest in the many advertising people who attended the recent 14th district convention of the Advertising Clubs of the World in its city, the Denver Gas & Electric Light Company entertained the delegates at a dinner dance held quite recently at the Denver Motor Club mountain club house in Bear Creek Canyon. Clare N. Stannard, vice-president and general manager, and George W. Bixler, director of publicity for the company, acted as hosts.

According to a report recently made public by the Washington State Department of Public Works, privately owned public utilities in Washington during 1921 paid 14.96 per cent of their gross revenues in taxes to the state. Steam railroads paid the highest percentage of their revenues and the total amount paid by the utilities was \$11,143,940.81. Electric companies paid the second highest percentage of gross receipts with a total of \$1,556,381.86 or 9.6 per cent of gross revenues.

Ogden and Salt Lake City, Utah, have recently been given the opportunity to purchase the rights of the Great Basin Power Company on the Duchesne River. H. A. Strauss, vice-president and chief engineer of the company has made the offer to the two cities with the suggestion that they operate municipally owned light and power systems. The proposal was set aside until future meetings by the city councils.

Personals

R. U. Muffley, formerly superintendent of light and power, Bellingham division, Puget Sound Power & Light Company, has been named manager of the Washington Coast Utilities' prop-



R. U. MUFFLEY

erties recently acquired by the Seattle company. These properties, consisting of electric, gas, telephone, water and ice companies in seven cities, will be operated as a separate unit under the direction of Mr. Muffley. Mr. Muffley was born in Fairmont, Minn., in 1883 and educated in the public schools of that city. After being graduated from the Tolands Business College of La Crosse, Wis., he became associated with the Fairmont Electric Light Company. He came West in 1903 and took a position with the Globe Electric Company of Seattle, engaged at that time in miscellaneous construction operations. Early in 1904 he went to Bellingham and became affiliated with the Whatcom County Railway & Light Company as motor repairman and wireman. In 1906 he was promoted to foreman of inside construction and motor repairs. In 1908 Mr. Muffley was named superintendent of distribution and in 1911 was again promoted to the position of superintendent of light and power in charge of all light and power plants, street railways and gas plants owned by the corporation in this district. He held this position until his promotion and transfer to his present post.

Robert C. W. Libbey, of San Francisco, Western States sales representative of the Simplex Electric Heating Company, has been in Los Angeles for a few weeks going over the territory with members of the Reiman Wholesale Electric Company, local jobbers of Simplex heating appliances.

Will H. Gibson of Mountain Home, Idaho, has been named to the Idaho Public Utilities Commission, to succeed George E. Erb, whose term expires April 1.

V. S. McKenny of the NePage-McKenny Company, Seattle, was in San Francisco recently to attend the funeral of L. L. Brown.

R. E. Fisher, vice-president in charge of sales, Pacific Gas & Electric Company, has been named vice-general chairman of the Joint Committee for Business Development. Other western men who have been appointed to the personnel of the organization include H. J. Gille, sales manager, Puget Sound Power & Light Company, C. C. Hillis, vice-president and treasurer, Electric Appliance Company, San Francisco, S. M. Kennedy, vice-president in charge of public relations, Southern California Edison Company, and W. R. Putnam, vice-president and general manager, Idaho Power Company.

W. E. Barrett, formerly of the Denver Gas & Electric Light Company, has been appointed to the publicity department of the Westinghouse Company in the Rocky Mountain region with headquarters in Denver.

A. T. Goward, manager at Victoria, B. C., for the British Columbia Electric Railway Company, Ltd., recently spent several days in California conferring with central station executives.

Charles E. Wiggin, manager of the electrical department of Dunham, Carrigan & Hayden Company, San Francisco jobbers, has resigned to join the sales department of the Pacific States Electric Company. Mr. Wiggin is one of the best known figures in the jobbing industry in the West and for the past year he has served as chairman of the Pacific Coast Division of the National Electrical Supply Jobbers' Association. Mr. Wiggin is a native of San Francisco. During his career in the electrical industry he has been engaged in every phase of the business except the engineering branch. Nineteen years ago he became associated with Will & Fink, electrical contractors, and engaged in construction work of every character. Later he became secretary of the San Francisco Electrical Contractors' Association and served in this



CHARLES E. WIGGIN

capacity for several years. Subsequently he was employed in the San Francisco office of the Western Electric Company as chief clerk and later with the John R. Cole Company, manufacturers' agents. He joined Dunham, Carrigan & Hayden Company in 1910 and has advanced steadily until, at the time of his resignation, he was head of the electrical department.

Louis F. Leurey, prominent consulting electrical engineer of San Francisco, has been elected president of the San Francisco Electrical Development League for the coming year. He is an outstanding figure in the electrical industry of the West and has been one of the most active members of the Development League. During the past year he has acted as vice-president of the organization and chairman of the program committee. Mr. Leurey is a graduate electrical engineer from Tulane University of Louisiana with the



LOUIS F. LEUREY

class of 1902. His first connection with the electrical industry was in the testing department of the General Electric Company. From 1904 to 1913 he held important engineering positions with the following companies: New Orleans Railway & Light Company, Spokane & Inland Railway and British Columbia Electric Railway, Ltd. Mr. Leurey is perhaps best known through his connection with the Panama-Pacific International Exposition, where as assistant chief mechanical and electrical engineer, he had charge of all field installations and operations. Since 1917 he has been engaged in consulting electrical engineering work with offices in San Francisco. He has been instrumental in the design of many electrical installations in western industrial plants and mines. He is a member of the American Institute of Electrical Engineers and the American Association of Engineers. With his wide acquaintanceship and deep-rooted interest in the affairs of the Electrical Development League, his inauguration promises to be one of the most noteworthy in the history of the organization.

Claude Mitchell, of the Board of Underwriters of the Pacific, is in the East attending the meetings of the committee which is revising the present national electrical code.

D. W. Hooper and M. L. Hooper, formerly of San Francisco, are now located in Los Angeles where they have established a branch of the Wessix Electric Heaters, with which firm they have been connected for the past several years.

Carl M. Heintz, manager, publicity department, Los Angeles office of Westinghouse Electric & Manufacturing Company, recently spent a week in San Francisco going over plans and appropriations for the coming year with the San Francisco representative.

Richard Sachse, chief engineer of the California State Railroad Commission, resigned from that position on March 1, 1923, to engage in consulting engineering work in Los Angeles. He has been with the California Commission since 1912 and has held the position of chief engineer since 1914. During that time he has handled many important engineering matters which have come before the commission, including the valuation of the Los Angeles city distribution properties of the Southern California Edison Company, and valuation of the



RICHARD SACHSE

B. C. J. Wheatlake, supply manager of the General Electric Company in the Rocky Mountain district, with headquarters in Denver, was a California visitor after attending the annual convention of the New Mexico Electrical Association in Albuquerque, where he was one of the chief speakers. Other members of the Denver contingent to attend the convention were A. C. Cornell of the Western Electric Company, J. C. Davidson of the Hendrie & Bolt-hoff Manufacturing & Supply Company, G. O. Hodgson of the Edison Lamp Works, George E. Lewis of the Rocky Mountain Utilities Committee, and J. F. Greenawalt and Joseph Moorhead of the Mountain States Telephone & Telegraph Company.

Kenneth M. Cross, formerly in business for himself in Portland, Ore., has just recently moved to Los Angeles and is now connected, as a salesman, with the firm of C. W. Cole & Company, manufacturers of reflectors and other equipment for store and show window lighting.

Richard E. Smith, advertising manager of the Southern California Edison Company, has been inaugurated president of the Los Angeles Electric Club for the coming year. He has been one of the outstanding figures of the club during the two years of its existence and his rise to the presidency has been marked by an unselfish desire to serve and to perform all tasks assigned to him willingly and without hope of reward. His contributions to "Sparks," the weekly bulletin of the club, has won for him a large and loyal following, and this, together with committee work and the directing of programs, has culminated in his election to the highest office in the club. Mr. Smith has been engaged in the electrical industry in California for the past seventeen years. He started as a wireman's helper in San Diego and from this beginning he held successively the positions of Pacific Coast representative of the National X-Ray Reflector Company, sales man-



RICHARD E. SMITH

ager of the Mt. Whitney Power Company, district manager, Tulare office, Southern California Edison Company, and for the past two years the position of advertising manager of that company. With a man of Mr. Smith's personality and enthusiasm at the head of the Electric Club, the organization is bound to prosper during the coming year.

Dr. Joseph Merrill, dean of the engineering college of the University of Utah, has been elected president of the Engineering Council of Utah. He has been an active figure in this organization, which is an affiliation of all of the engineering societies of Utah and which represents approximately 1,500 men of the engineering profession in that state. The Council sponsors weekly luncheons at the Salt Lake City Commercial Club at which matters of general engineering interest are discussed. Dr. Merrill received a degree of B.S. from the Uni-



DR. JOSEPH MERRILL

properties of the Pacific Gas & Electric Company, Great Western Power Company and Southern California Edison Company. Mr. Sachse is a graduate civil and structural engineer. He did railway, hydraulic, electrical and harbor engineering work in West Africa, Belgium, Germany and Norway before coming to the United States in 1903. Since that time he has been connected in an engineering capacity with the Western Electric Company, United States Steel Corporation, United States Reclamation Service, Southern Pacific and Western Pacific railways. He was recently appointed chairman of the Engineering Advisory Committee in connection with the railroad valuations being made by the Interstate Commerce Commission. His work as chairman of the Inductive Interference Committee is well known to the electrical industry. After leaving the Commission his first work will be a comprehensive investigation of the street railways of Los Angeles with a view of bringing about a unification of the two systems in that city.

James W. Kuse, formerly of the Rocky Mountain district of the Edison Electric Appliance Company, has just recently been transferred to the Los Angeles district of that company as sales representative.

T. A. Brooke, sales manager, Illinois Electric Company of Chicago, is in Los Angeles on a visit. Mr. Brooke has been quite active in the affairs of the Electric Club of Chicago and was a member of the executive committee during the past year.

F. J. McEniry, field representative of the Denver Electrical Cooperative League, has received a commission as a lieutenant in the military intelligence section of the officers' reserve corps, according to recent orders of the adjutant-general of the army.

versity of Michigan in 1893 and continued his studies at Johns Hopkins University, receiving his Ph.D. from that institution in 1896. He was assistant professor of chemistry at the University of Utah in 1897, director of the Utah State School of Mines at the University in 1898 and since 1899 has been professor of physics and electrical engineering. He has contributed to the electrical engineering profession largely through research work. He has been very active in the Utah section of the American Institute of Electrical Engineers and during the year 1920-21 served as chairman. It was during his term of office that the Utah section acted as hosts for the national convention of the A.I.E.E. which was held at Salt Lake City.

Obituary

L. L. Brown, California representative of the H. E. Gleason Company of Seattle, one of the most active figures in the electrical industry on the Pacific Coast, died suddenly in San Francisco on March 7. Mr. Brown was a native of Duluth. He came west 17 years ago, entering the electrical industry in Spokane. Three years later he joined the Seattle office of the Western Electric Company where he remained for 12 years. He had been with the Gleason Company for the past two years. Mr. Brown, during the time he had been in California, took an active part in the affairs of the electrical industry in both San Francisco and Los Angeles. He is survived by his mother, his wife and two children. He leaves a host of friends throughout the entire Pacific Coast region.

Manufacturer, Dealer and Jobber Activities

L. A. Clark and J. Wesley Burdsal have opened a well equipped showroom and office at 1822 South Hope Street, Los Angeles, and will engage in all branches of illumination engineering. Mr. Clark was formerly with the Electric Appliance Shop and Mr. Burdsal was employed by the Illinois Electric Company.

The Line Material Company of South Milwaukee, Wis., has recently prepared for distribution, a booklet entitled "Traficons" which contains a description of its new system of traffic control devices. The various designs of traffic-directing devices manufactured by the company are illustrated and described.

The Huggins Electric Company is the new name of the R. C. Young Electric Company, of Trinidad, Colo., the company having been purchased by C. W. Huggins of that city. Mr. Huggins was formerly an electrical expert for the Trinidad Gas & Electric Supply Company.

H. D. Thomas, Denver manager of the Federal Electric Company, has stated that it is planned to organize a force in that city for house-to-house sales of the washing machines manufactured by his company.

The Robbins & Myers Company of Springfield, Ohio, has placed on the market a new line of split-phase fractional motors designed for washing machines, ironing machines and other household and office appliances. The new motors have been designed to make for low temperature rise and quiet operation and have been materially reduced in weight. At present these motors are in production in 1/6 and 1/4-hp. sizes for 60-cycle, 110-volt circuits. Direct current motors are also being produced. The company also plans to manufacture 1/10 and 1/8-hp. sizes in both a.c. and d.c. designs in the near future.

The Hubbard Machine Company, San Francisco, has recently published a booklet concerning its line of domestic water pumping units. The new pumps are designed for use where city water is not available, and where it must be secured from wells. The new pump runs entirely in oil and is automatically controlled. The new unit is now on display at the office of the company in San Francisco.

The Engineering & General Supply Company, of Los Angeles, Calif., of which J. G. Monahan is manager, has been appointed the Los Angeles district agent for the Railway & Industrial Engineering Company, of Greensburg, Pa. The agents have territory including southern California and Arizona. The Railway & Industrial Engineering Company manufactures a line of outdoor transmission switching and protective equipment.

The Panama Lamp & Commercial Company, a San Francisco firm which is headed by Joseph Thebin, is now located at 1062 Mission Street. The company was formerly situated at 595 Mission Street.

C. T. Smallcomb, an electrical contractor of Los Angeles, Calif., has recently moved to 655 Wall Street in the same city. The demand for more room for increasing business brought about the change.

The George A. Gray Company, of 910 Howard Street, San Francisco, and 236 South San Pedro Street, Los Angeles, has recently been appointed western states representative of the F. W. Wakefield Brass Company of Vermillion, Ohio.

The Wagner Electric Corporation, St. Louis, Mo., has recently published Bulletin No. 131, which is an instruction booklet for persons ordering and adjusting repair parts for Wagner single-phase motors. The booklet is well supplied with illustrations and gives the motor operator definite and adequate instructions to follow in locating the causes of trouble.

The Westinghouse Electric & Manufacturing Company representatives in the Rocky Mountain region held a sales conference in Denver, Colo., March 1-2, under the direction of the district manager, L. M. Cargo.

The Central Electric Company, of which J. M. Carlson is the manager, has moved from 185 Stevenson Street to 179 Mission Street, San Francisco. The firm specializes in contracting and merchandising of electrical equipment.

The Pacific Electric Manufacturing Company has been provided representation in Denver, Colo., by J. Ludwig Hansen, an electrical engineer of Salt Lake City, Utah, who recently opened offices in the Colorado capital.

H. G. Whitten has been placed in charge of the Apex Electrical Distributing Company branch in Denver, Colo., recently opened in the new Wilda Building. Seventy representatives have been appointed in the territory and sub-offices in a dozen Colorado cities are maintained. The company recently became subscribing members of the Electrical Cooperative League in Denver.

The Hendric & Bolthoff Company, Reynolds Radio Corporation, The Winner Radio Corporation, Rocky Mountain Radio Company and the Mine and Smelter Supply Company, in the interests of better programs, through the radio jobbers' association of Denver, Colo., have arranged to provide regular afternoon and evening programs over the Reynolds and Winner stations under the direction of Jack O'Brien, a well known Denver promoter.

Mitsui & Company, Tokio, Japan, has just been appointed exclusive representative in Japan and China for Uehling CO₂ Recording Equipment and other Uehling power plant instruments and gages. The main office and factory of Uehling Instrument Company is in Paterson, N. J. Many Uehling installations have been made in Japan and China without the aid of local representatives but it is believed that with the cooperation of the very able engineering department of Mitsui & Company, the Japanese and Chinese Uehling customers will be served to the best advantage.

The H. M. Thomas Company, of Oakland, Calif., has recently taken over the representation of the Edwin L. Wiegand Company of Pittsburgh, Pa. H. M. Thomas is president of the firm which is located in the Oakland Bank Building in the San Francisco Bay city.

The Getz Washer Sales Company, distributors of the Getz washing machine, has recently been established at 910 South Grand Avenue, Los Angeles, Calif., under the management of Fred H. and George C. Kanne. Both men were formerly distributors of the Getz machine in Illinois.

The K-P-F Electric Company, a contractor-dealer firm of San Francisco, has recently moved from 37 Stevenson Street, to 855 Howard Street. A. S. Pahl is the proprietor of the firm.

The Chandelier Electric Manufacturing Company, is the name of a new electrical fixture manufacturing company established in Seattle, Wash., by W. F. Foster of that city. A factory and sales office have been located at 1619 Westlake Avenue. Mr. Foster was formerly of the United States electrical division at the Panama Canal.

The Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has published Bulletin No. 1632-F, which is devoted to showing various applications of the centrifugal pumps and centrifugal pumping units manufactured by the company. Illustrations in the booklet present an idea of the variety of industrial applications that may be made with the equipment and reading matter describes the pictures in an adequate manner. Applications of the company's equipment in power plants are also illustrated and described. Head capacity tables, friction tables and Weir tables are reproduced in the booklet.



When H. L. Garbutt first thought of joining the forces of the Westinghouse Electric & Manufacturing Company, he had visions of himself as he may be seen above. In reading through one of the lists of requirements for eligibility to the ranks of Westinghouse, Harry found that to be a success, it would be necessary to become a proficient golfer. Thus it was that by following the rules of the company, he came to be one of the best golfers in the electrical industry on the Pacific Coast and at the same time made himself merchandising manager of the San Francisco office. In the picture above, Harry had a hard time getting his ball out from behind the shadow, but he did it eventually and nearly qualified for the "Hole in One Club."

Trade Outlook

Los Angeles

An unexpectedly large building total for Los Angeles was rolled up in the short month of February due to the issuance of a large number of permits, which have been held back by the congestion of work in the city building department. During the month, 4,104 permits with an estimated valuation of \$12,080,310 were issued, as compared with 2,842 permits with an estimated valuation of \$7,579,798 for February, 1922. This is the high record for February and next to the high record for any month, which was \$12,964,829 for April, 1922. For the first two months of 1923 the total is \$23,338,827, an increase of \$7,783,861 over the same period last year.

The above figures clearly demonstrate that Los Angeles has made a flying start toward a new record building year, and other communities of the Southland, not to be outdone by the bigger city, are coming forward with records of their own which are no less astonishing, and no less indicative of the tremendous forward strides which are being taken by all of southern California. In many of the communities a new high point for building was reached during February and there were few instances where February fell lower than second highest month.

The continued influx of people and huge building program are keeping manufacturer, jobber, central station and dealer busy. All continue to report increased sales and no signs of a let-up.

Denver

Denver, with a public building and construction program for this year of \$16,000,000, takes third place in a nation-wide survey of contemplated expenditures by municipalities for public building operations, the other cities exceeding Denver in this respect being Los Angeles and New Orleans. February building permits totaled \$835,000 which with the January record places the first two months of the year in excess of two million dollars.

All principal building materials are advancing in price and this upward trend is not apparently discouraging any phase of the general building program. Several wage increases have been awarded building craftsmen, and others are contemplated to be effective May 1. Prices on new houses are 10 per cent higher than last year but this increase is not reflected in the prices being obtained for electrical work.

Several heavy snow storms with the coldest weather of the season have damaged transmission lines and delayed outside construction in some areas. This has permitted local jobbers to adjust their stocks and analyze the market, especially copper. Radio is prospering, thanks to an arrangement between the leading dealers providing for attractive programs to be broadcasted every afternoon and evening.

Portland

General business conditions are good. Rapid expansion is evident in many different lines of business. Due to the severe weather one week in February, during which time practically no building permits were issued, the total value of permits issued in February in 1923 dropped about 7 per cent below the corresponding figure of a year ago. Construction work is now being pushed.

The lumber industry has now about recovered from the effects of the storm late in February. There still exists a shortage of logs which is reflected in the output of the mills.

The shipping industry of the Port of Portland is far ahead of last year at this time. Vessels are being added to all the important trade routes to care for the added cargoes. During March, 35 vessels plying between Portland and Atlantic and Gulf ports will arrive in Portland. This is 50 per cent greater than a year ago.

The Portland Chamber of Commerce reports an unprecedented number of inquiries from large concerns seeking locations and opportunities for branch factories.

Bank clearings of Portland banks during February, 1923, were \$116,186,034 as compared with \$103,145,607 for February, 1922. The financial conditions during 1923 are anticipated with general optimism.

Power companies are placing large orders for equipment, especially transmission material. Shipments are lengthening.

Seattle

Despite the fact that February is a short month and that the city was visited by an exceptionally severe snowstorm which temporarily halted all building activities, the month showed one of the best records for building in the city's history. Building permits for the month were valued at \$2,023,250, and showed an increase of \$1,412,645 over February of last year.

The month made a good showing in other lines also, with bank clearings \$16,000,000 in excess of February of last year, or a total of \$131,653,686.

The first nine weeks of 1923 show an increase of 15 per cent in production of lumber over any similar period in the history of the West Coast Lumbermen's Association, and manufacturers are very optimistic over the prospects for spring and summer. There are but two storm clouds on the lumber horizon, the threatened labor and car shortage, and the association is taking precautionary measures to combat these.

Electrical jobbers and retailers report a comparatively active period since the first of the year, with demand for electrical equipment showing slow but steady improvement. There has been active demand from lumber mills throughout the Northwest, and an increasing tendency to employ electricity in their operation. Retail store business is be-

ginning to show rapid recovery from the after-season lull. Considerable equipment has been sold for repairs to electric lines throughout the state, due to the heavy snowstorm in February.

San Francisco

The importance of California as an oil supply center has been increasing lately and this fact is partly responsible for the shortage of tankers on the Atlantic seaboard. The rate of production is so high in the state at present that the demand is not expected to cut into reserve stocks. Gasoline and crude oil prices are remaining constant and it is not expected that the export demand will cause any flurry in the market.

The spring season which started the first of the month shows possibilities for an expansion in home and industrial construction. New irrigation projects are also being contemplated from several different sources. Building is increasing rapidly under the favorable weather conditions and it is thought that March will set a new record and keep up the advance that was made in February. Statistics show that during February the value of building permits issued in San Francisco came to \$3,278,676, covering 782 different construction projects. This is an increase of over \$600,000 over February, 1922, and also is in excess of the January total.

Business in general is in good condition in the San Francisco Bay region and electrical men feel that a prosperous spring building era is ahead of them. Architects' plans indicate that new buildings and homes will be better supplied with electrical outlets than they have been in previous years.

Salt Lake City

Immediate construction of the first unit of the Columbia Steel Corporation's blast furnace and byproduct coke oven plant between Provo and Springville, Utah, has been ordered, and ground has actually been broken. The operation of this plant, with the enlarged activities which will develop in the future, to meet the anticipated increase in demand for its product, will mark a new era in industrial development in the intermountain section.

Another healthy sign is the action of the Utah Copper Company's directors, increasing the quarterly dividend from fifty cents to one dollar. Copper mining is one of the basic industries of this section, and the continually increasing operations of the Utah company are very encouraging.

Considerable improvement in wholesale trade is reported for the intermountain territory during the past thirty days.

Electrical dealers are concentrating their efforts during the month of March on washing machine sales, and some very good results have so far been obtained.

The Retail Credit Men's "Pay Your Bills Promptly" campaign has had a marked effect on the local credit and collection situation, and considerable improvement is noted.

Increased business activity, as compared with the same period last year, is shown by a general survey of the situation, and even greater improvement is expected from now on.

Construction News

Bridges

Ore., Montesano—The Pacific Construction Company has been awarded two bridge contracts by the Grays Harbor county commissioners, one for rebuilding several small trestle bridges and the South Bay trestle near Westport, \$28,723, and the other the retimbering of the bridge over the Chehalis River at Porter, costing \$11,791.

Ore., Hood River—Steps are being taken for the construction of a toll highway bridge across the Columbia River connecting Hood River with White Salmon, Wash. The plans, as outlined by the engineers who propose to finance the structure by a flotation of a \$275,000 bond issue, call for work as soon as the high water of the coming summer shall have subsided.

Ore., Astoria—The plans and specifications for the new Lewis and Clark span are ready for the government, according to C. B. McCullough, bridge engineer for the state highway commission. The structure will be a bascule type bridge with a draw opening of 100 ft. in the clear. Bids have been called for to be opened at the April meeting of the highway commission.

Wash., Chehalis—Lewis County commissioners have instructed the county engineer to prepare plans and call for bids for two new steel bridges in Lewis County, one across Olequa Creek and the other at Bremer.

Wash., Yakima—The state highway commission will replace the present bridge across the Yakima River at Easton, with a new steel structure.

Wash., Olympia—The state highway commission will call for bids very shortly for an overhead bridge at Kelso, two bridges between Centralia and Chehalis, and another south of Toledo in Lewis County. It is expected that the proposed \$200,000 concrete bridge at La Center will be started this summer. It will be 1,100 ft. long and will be provided with sidewalks.

Wash., Aberdeen—An extensive program of bridge construction is planned for Grays Harbor County during the coming season. A contract for a \$40,000 steel structure across the Hump-tulips River, near Wilderness, was let last month and the trestles on either side of the South Bay bridge will be rebuilt this year. The Chehalis River bridge will be rebuilt and a new bridge constructed over the Satsop River at the Dan Gleason farm. A bridge joining Grays Harbor and Mason counties at the Turnow place on the Upper Satsop River will be constructed, Mason County being requested to share the expense.

Dams

Calif., Napa—Contracts totaling over \$200,000 for the construction of the dam in the Milliken Canyon project, which will give Napa a municipal water system, have been awarded as follows: Bordwell & Zimmerman, of Calistoga, were awarded the contract to construct the dam at a cost of \$117,980. The contract to furnish 25,000 sacks of cement for the dam was divided between the F. G. Noyes Company and the Napa Lumber Company, both of Napa, at a total cost of \$77,000. Steel for reinforcement will be supplied by the Badt-Falk Company of San Francisco for \$1,636.80. The gate valves will be furnished by the Water Works Supply Company of San Francisco. The cost will be \$844.70. Contract for all iron work to be used in the construction of the dam was awarded to the San Francisco Engineering Company for \$4,268.

Calif., San Diego—The estimated cost of raising Switzer Canyon dam is \$28,463, according to

a report filed with city council by city engineer, F. A. Rhodes. The proposed improvement includes raising the height of the dam, \$19,207, extending the conduit, \$989, and construction of a spillway and channel, \$6,911.

Highways

Calif., Yreka—A contract for construction of a section of the Salmon River road has been awarded to the Warren Construction Company, of Oakland, for \$92,201.

Calif., San Francisco—Contract for the construction of a boulevard from Lincoln Park to Sutro Heights has been awarded to James McElroy by the Board of Public Works. The road will cost approximately \$56,000. It will be constructed between the base of the cliff and the lines of the Market Street Railway.

Calif., Oroville—Contract for the construction of nine miles of county road near Honcut has been let to Heafey, Moore & McNair, of Oakland, by the board of supervisors; price, \$73,089. Work will start at once. Collins & Seppi, of Oroville, were awarded contract for construction of 6½ miles of the Chico-Butte City county road. The Neill grade from the highway near Durham to Paradise will be built by day labor. H. H. Hume, county engineer, will be in charge.

Ore., Portland—Bids on approximately \$800,000 worth of additional highway work which it is proposed to carry out during the coming season are being advertised by the state highway commission. In addition, plans for over \$550,000 of federal forest highway work in which the state will cooperate were approved and bids will be called for shortly by the U. S. Bureau of Public Roads. The next meeting of the highway commission is set for March 27, at which time the bids will be opened. Among the projects being advertised are the following: Pacific highway Eugene to Goshen, re-surfacing and widening pavement, 4.8 miles, estimated cost \$120,000; Roosevelt highway in Coos county, grading, Fat Elk to Lampa Creek, between Coquille and Bandon, estimate \$200,000; Roosevelt highway in Lincoln county, grading, Agate beach to Otter rock, estimate \$200,000. Bids to be called shortly by government engineers for which the sum of \$550,000, including forest and state money, is available, include the following: Alsea highway from Waldport to Corvallis in the Siuslaw national forest, grading from Waldport to the Benton county line, sum available, \$48,000. Roosevelt highway in Lincoln county, Siuslaw national forest, grading from Devils Lake to the Siletz River and completion of rock surfacing from Siletz River to Neskowin, \$217,000. Eugene-Florence highway, Siuslaw national forest, grading from Blachly to Rainrock, \$75,000. This is in addition to \$300,000 already provided for this road. Crater Lake highway, Crater national forest, gravel surfacing from Prospect to the national park boundary, nine miles, \$67,500. Mount Hood loop highway in Oregon national forest, south from the north boundary of the forest reserve, gravel surfacing, \$37,500. Coast highway in Coos County, Umpqua national forest, Hauser to Douglas county line, grading, \$110,000.

Ore., Portland—John Hampshire has been awarded contract for grading 82½ miles of the Crater Lake highway in Jackson County, on a bid of \$132,237.

Utah, Ogden—Engineer B. J. Finch of the bureau of public roads for the states of Utah, Idaho and Wyoming has announced that an extensive campaign of road construction in those

states is outlined in the estimate and plans of the bureau of public roads. The official notice reads as follows: Idaho—North fork Payette No. 2, ten miles located between Gardena and Banks on the Payette River; Salmon-Montana line, 10 miles from Gibbonsville to Montana line on the north fork of Salmon River; Lowman-Stanley, 7 miles from Lowman up south fork of Payette River; Soda Springs-Freedom, from Freedom west; Ketchum-Clayton, a section near the old town of Galena; Warren wagon road 6 miles. Utah—Panguitch-Tropic 8 miles through Red canyon; Bryce canyon, 4 miles leading to Bryce canyon hotel; Cedar-Long Valley, Kane County section, 13 miles, which will complete the road from Cedar west to state highway on Sevier River. Wyoming—Salt Creek-Smoot, 4 miles, an extension of state road from Cokeville north; Wind River, an extension of the road over Wind River mountains to Moran, 17½ miles. Notices to contractors will be ready within a few days, giving location, quantities and character of work; also announcing date that proposals will be received. Sufficient time will be allowed for prospective bidders to inspect the projects. Other proposed construction will be announced as rapidly as plans can be completed.

Utah, Ogden—Work on the Riverdale viaduct will begin on July 1, according to announcement from the office of the U. S. Bureau of Public Roads in Ogden. A bridge will also be built. Estimated cost of bridge and viaduct is given as \$300,000.

Wash., Kelso—Bids will be received and contracts awarded on March 27 for 5.3 miles of paving from Kelso north and 4.6 miles from Castle Rock south, the jobs to cost about \$350,000, and April 10 contracts will be awarded for paving 4.7 miles from Castle Rock north, 5.5 miles from Laughlins spur north and 4.8 miles from Toledo south. This work will cost about \$500,000 and must be completed by Sept. 1. The work will be allowed to set for 30 days before being opened to travel.

Wash., Seattle—A King County road project which will be up for bids shortly is a two-mile paving job on Maury Island, between Dockton and Molita, estimated by County Engineer T. R. Beeman to cost \$70,000. A large piling trestle is included in the work.

Wash., Bellingham—Chris Sauset, here, on a bid of \$47,418.50 received the contract for construction of the Husum-Trout Lake road in Klickitat county, 5.1 miles long, including grading and draining.

Wash., Seattle—Seattle and King County will join in the construction of an arterial highway 20 ft. wide, to open up the White Center District and the territory between White Center and Lake Burien. T. R. Beeman, King County engineer, and J. D. Blackwell, city engineer, are preparing plans for the project, which involves 7-in. concrete paving 3 miles long, costing \$75,000; grading and relocating the highway will cost \$75,000 additional.

Wash., Spokane—Spokane County, which has a \$7,500,000 road program this year, has awarded the first work to the Mohr Construction Company. The Hite road work calls for 7 miles of crushed rock on macadam road.

Wash., Olympia—Paving of the Pacific highway between Toledo and Kalama will be completed by Oct. 1. An emergency appropriation was made of \$1,670,000 for the work, and plans are now completed for letting the first contracts.

Irrigation Projects

Ariz., Phoenix—The Salt River Valley Water Users' Assn. has received sanction of secretary of interior and state legislature for an increase in its bonded indebtedness beyond the two-thirds of its capital stock allowed by law. This will enable the association to issue \$1,800,000, 6 per cent bonds, payable in 15 to 25 years, for the purpose of constructing a regulating dam

at Mormon Flat, on the Salt River, the construction of control gates at the Roosevelt dam, and the construction of additional hydroelectric power equipment. The gates comprise 19 steel gates in the spillways of the Roosevelt dam, while the power project involves a 7,000-hp. generator in the Roosevelt power house. F. A. Reid, Phoenix, is president of the association.

Calif., Oroville—By a vote of slightly better than seven to one the voters of the Thermalito Irrigation District authorized a bond issue of \$275,000 for the purchase and improvement of the present system.

Calif., San Diego—Residents of the Del Mar-Carroll district, owners of 9,000 acres of agricultural land, have organized the Santa Fe Irrigation District. The project has been promoted by Col. Ed. Fletcher. A bond election will be held to finance the district, and later a contract will be signed with San Dieguito Mutual Water Company to furnish water, piped to every 40 acres.

Idaho, Boise—Reclamation work, costing when complete \$5,000,000, is being planned at Baker. A dam will be built on Powder River and will furnish water for 40,000 acres.

Ore., Pendleton—Actual construction work on the McKay Creek storage project for irrigation in Umatilla County will start this summer, involving expenditure of more than \$1,000,000. The completed storage dam means supplementary water for approximately 28,000 acres in Umatilla County now under irrigation, but which do not have enough water to carry the last crops to full growth, and will give a complete water supply for 20,000 additional acres. The total cost of the project is estimated at \$2,000,000.

Wash., Spokane—Three contracts have been let by Spokane County on various irrigation projects in the county, as follows: E. J. Cheatham & Sons, Spokane, contract to excavate 100,000 yd. of material for ditches and pipe lines and a contract for two miles of flume, total cost \$40,000; Delivuk Orino Construction Company, Spokane, contract to construct a 640-ft. tunnel half a mile west of Spokane Bridge and passing through a solid rock point; American Wood Company, Tacoma, contract for expenditure of \$62,646 in wood stave pipe. The Spokane Valley irrigation project, in charge of R. K. Tiffany, will cost more than \$600,000 to complete.

Power Plant Equipment

Ariz., Tucson—Tucson Gas, Electric Light & Power Company has authorized extensions and betterments amounting to \$300,000. Work will include gas mains costing \$50,000, new buildings erected to house a new 850-hp. Diesel engine, new tracks, paving, etc. Sam Headman, engineer in charge of construction.

Colo., Grand Junction—Improvements to the extent of \$30,000 have been authorized by the Grand Junction Electric, Gas & Manufacturing Company, which will include the construction of a new fireproof boiler house, a new boiler installation, and additional distribution facilities.

Ore., Roseburg—Improvement work at the power plant at Winchester, supplying electric power to Roseburg and the towns in the northern part of the county, is to be started at once and the capacity practically doubled. Hydraulic engineers have been making a survey of the feasibility of adding another unit and have worked out the details of the plan. It was estimated that approximately \$200,000 will be spent in adding the facilities for the generation of power.

Utah, Logan—The city of Logan will hold a bond election April 2, to decide the question of issuing \$200,000 in bonds for the purpose of enlarging and increasing the facilities of the city electric light plant.

Wash., Vancouver—Work has been started on a \$75,000 substation to be built here by the

Northwestern Electric Company, the station to be located at 8th and King Streets.

Wash., Tacoma—The city council will appropriate \$45,000 for the construction of a substation for the city light department to serve the South Tacoma district this year. Work will begin soon.

Power Projects

Ore., Klamath Falls—Construction of a 22-mile transmission line from Algoma to Chiloquin to cost \$60,000 will be started as soon as weather conditions permit. This work is to be done by the California Oregon Power Company and will give that concern entrance into a new field. The line will furnish light and power for the large mills of the Chiloquin district and will add about 1,500 hp. to the consumption of electricity in the Klamath district of that company. The line will have a capacity of 60,000 volts.

Ore., Pendleton—A survey of the proposed \$300,000 high line from Pasco, through Umatilla to Pendleton, has been begun by engineers of the Pacific Light & Power Company and actual construction will start early this summer, and will be completed before next winter. The proposed line will carry 66,000 volts, where the present line into Pendleton only carries 20,000 volts. In addition it will mean closing a circuit so that Pendleton may be served either from Walla Walla or Pasco.

Wash., Oroville—Plans are being made to erect a hydroelectric plant on the McLaughlin Rapids that will generate upwards of 3,000 hp. The plan is to bond the district for \$450,000.

Wash., Vancouver—The Clarke County Water, Light & Power Company has recently organized for the purpose of supplying electric light and power to Hockinson, Battle Ground, Brush Prairie, Orchards, Sifton, Heisson and other towns. It will secure water from springs in the mountains near Battle Ground. Papers call for \$50,000 and authority to make further issues of stock to the amount of \$150,000.

Railways

Calif., Stockton—Announcement has been made by Charles M. Levey, president of the Western Pacific Railroad Company, that his company will spend \$1,500,000 in Stockton this year in creating and equipping a system of terminal yards in the southern portion of the city. The company has purchased 130 acres of land lying on the eastern side of the track and extending for two miles south from South St. At the greatest point this tract is a quarter of a mile wide. The new yards will have trackage for 4,000 cars, or more than thirty miles of tracks. New engine houses and terminal shops are to be constructed, and an ice plant, with a capacity of 150 tons a day and a loading capacity for 200 cars daily, will be installed. This will be the principal icing station not only for the Western Pacific, but also for the Tidewater Southern.

Calif., Glendale—Roy L. Kent Co., 130 S. Brand Blvd., is preparing working plans for a 1-story concrete depot and store building and transformer station for Glendale & Montrose Ry. Co. on east side of Glendale Ave., 400 ft. north of Broadway; station 50 x 60 ft. with stores on each side, concrete tile, art stone front, cement mission tile roof, steel sash, cement floor, fireproof transformer house, 30 x 20 ft.

Calif., Calipatria—Southern Pacific Ry. Co. is starting work on construction of the new Holtville branch to connect with line at Calipatria. Contracts for work will be let in a few days. It is desired to complete the road before hot weather. Fifty thousand ties have been delivered.

Calif., San Diego—A. T. & S. F. Ry. will start work soon on line from San Diego to Phoenix through San Felipe pass to Indio and El Centro, and from there to Yuma and Phoe-

nix, Ariz. The right-of-way has been secured. H. G. Wells, vice-president, is in California at the present time and is inspecting the route.

Calif., Los Angeles—Lynch-Cannon Engineering Company, Chapman Building, was awarded a contract at about \$530,000 for erecting new shop buildings at Union Pacific terminal site east of Belvedere Gardens for Union Pacific Railway Company. Work will include power house, 2-story, 40 x 114 ft.; oil house, 1-story, with pump pits, 36 x 112 ft.; 2-story garage building, 42 x 252 ft.; car repair shops, 1 story, 80 x 281 ft.; blacksmith shop, 2 stories, 155 x 342 ft.; boiler shop, 195 x 254 ft.; locker room, 20 x 80 ft.; frame construction, corrugated iron exterior, steel and wood roof trusses, composition roofing, steel sash, concrete and mastic floors, traveling cranes. There will also be a brick roundhouse of 10 stalls which is the first unit of a building to contain 50 stalls.

Calif., San Bernardino—H. S. Wall, mechanical superintendent of the Santa Fe lines, stated that a boiler shop, costing \$600,000, a turntable, to cost \$40,000, and a tin and pipe shop to cost \$100,000 will be built at San Bernardino. Machinery to be installed in the boiler shop will cost \$200,000. The line between Daggett and Goffs will be double tracked, at a cost of \$3,000,000.

Calif., Los Angeles—Another railroad to Los Angeles harbor is now practically assured by the mayor's signature to an ordinance granting the Santa Fe Railroad Company a franchise to extend its transcontinental line into the harbor district. The extension will be 12½ miles long, branching off the company's tracks at El Segundo and will cost approximately \$2,000,000.

Mont., Helena—The Montana Railway Company, Inc., has a surveying crew starting south from Miles City for its railroad line which is to extend south and west of Miles City, Mont., into the Salt Creek oil field of Wyoming. The proposed route, approximately 250 miles long, will follow either the Tongue or Powder rivers to a connection with the Chicago, Burlington & Quincy Railroad in the vicinity of Sheridan, Wyo.

Mont., Miles City—The Northern Pacific expects to do improvement work on the Rocky Mountain division in the spring. They will construct two filling-in bridges on the Helena divide at a cost of \$217,000, constructing two 30-ft. girders on the Durant bridge over Silver Bow Creek, and rebuilding a mile of main line to eliminate bad curves.

Ore., Reedsport—A new freight and passenger station is to be built by the Southern Pacific Company. These buildings and some new trackage will cost around \$40,000.

Utah, Salt Lake City—The Utah Central Railroad Company, a new corporation capitalized at \$1,000,000, has been given permission to proceed with 50 miles of railroad in Utah by the interstate commerce commission. The new line will extend from Wellington to Huntington, with a branch to Utah Junction. The road will make available for operation a large coal mining area. James H. Mays, former congressman, is one of the principals of the new company.

Utah, Ogden—The Utah Construction Company, with headquarters in Ogden, has received instructions from the Union Pacific Railroad Company to proceed at once with the construction of the Lund-Cedar City line. Construction equipment is being moved from Ogden and Delta to Lund, Utah, where the work will be started.

Wash., Walla Walla—H. L. Wilson was awarded the contract for the grading for the extension of the Walla Walla Valley Railway Company. In addition to the grading, 15 spans of bridge must be laid and 400 ft. of pipe. The contract for the pipe has been let to the Walla Walla Concrete Pipe Co.

Wash., Longview—The Longview, Portland & Northern Railroad Company has revised plans for its single-track railway and will make it a double track line. Twenty-five miles of line will be built.

Wash., Kelso—The Nettleton-Bruce-Eschbach Company of Seattle, which is building the 12-mile extension of the Strahorn railway near Bend, Ore., was awarded the contract for grading of the Weyerhaeuser Timber Company railway route from Rocky Point to connect with the Ostrander Railway & Timber Company line, which will be extended to the Coweeman country. The extension will cost about \$80,000 and work will begin at once, according to Minot Davis, secretary for the Weyerhaeuser company. All right-of-way has been obtained.

Wyo., Sheridan—Right-of-way is now being purchased by agents of the Chicago, Burlington & Quincy railroad for a new branch line which will tap the semi-bituminous coal fields in southeastern Montana. Present plans provide for the expenditure of \$2,500,000 on the new division which later will be connected by a branch to the Northern Pacific at Forsyth, Mont.

Street Lighting

Calif., Santa Monica—D. S. McEwan, Santa Monica, submitted lowest bid at \$33,487 for constructing reinforced concrete ornamental lighting system on Santa Monica Blvd., between Ocean Ave. and 14th St., and at \$29,388 for that section between 14th St. and the city limits.

Calif., Redlands—City trustees have plans under way for street lighting to cost about \$10,000. Petitions have been started to add \$5,000 to the street lighting projected. Lights have been installed on Colton Ave. between Orange and the west city limits. They will soon be ready for use on Colton Ave., east to the University of Redlands. Eureka St. is to be lighted from Brookside Ave. to Cypress St. and Buena Vista Ave. is also to be improved.

Calif., Taft—An ornamental lighting system with 71 electroliers will be constructed on the principal streets of Taft. Other improvement work coming up includes about 7,000 lin. ft. curb and 4-ft. sidewalk and about a mile of street paving. E. M. Lynch, Central Building, Los Angeles, engineer.

Colo., Denver—In addition to several ornamental street lighting projects planned for the spring, new lamps at street intersections in the residence portions of the city have been authorized by the city council. About 150 new installations will be made consisting of arcs, 400-cp. incandescents, and a number of 80-cp. brackets. Serious thought is also being given to the illumination of all alleys in the business section of the city.

Wash., Aberdeen—Bids for an ornamental electric street lighting system are being called for by the city. Complete specifications are in the hands of the city engineer. The lights are to be installed on Heron, Wishkah, G and H Streets and on Broadway.

Streets and Sewers

Calif., Anaheim—Waard & Co., contractors of San Diego, have been awarded the contract for the ocean end of the outfall sewer to be constructed by the cities of Anaheim, Santa Ana, Fullerton and Orange. The company's bid was \$43,000 and includes the furnishing of 1,000 ft. of 42-in. segmental block pipe. Contract for the structure over the screening plant was awarded to Cox & Textet of Santa Ana on a bid of \$10,980.

Calif., Vacaville—April 3 has been set for an election to vote bonds totaling \$40,000 to improve the streets of Vacaville.

Calif., Newport Beach—Board of trustees will call a bond election May 10 for \$200,000 for the installing of sewer and water mains and street lights on Balboa Island, and for a pumping plant and a bridge on north side of the island.

Mont., Anaconda—Harrison Ave. is to be paved at a cost of \$180,000 for grading, paving, storm sewers, catch basins and other requisites for curb to curb pavements.

Utah, Ogden—The Security Bridge Company, which is building the main outfall sewer system for the city, was the lowest bidder for the construction of the sewer system in district 149, which is all the region north of Sixth Street in the Third ward. The bid was \$77,950 and the bidder agrees to have the work completed within 150 days. The bids were referred to the city engineer for tabulation and report.

Wash., Seattle—City council has decided to proceed with the grading and paving of Fauntleroy Avenue and Avalon Way, in West Seattle at a cost of \$250,000, upon petition of property owners. The total distance is three miles.

Wash., Centralia—The city commission is completing plans for paving of approximately 50 blocks in the First, Main Street and Washington Avenue districts. N. W. Avery, city engineer.

Wash., Chehalis—The Albers Construction Company, here, has taken over a contract to build $3\frac{1}{4}$ miles of concrete pavement on the National Park highway, from Elbe, Pierce county, toward National. The roadway is to be 18 ft. in width. The Elbe contract was originally let to B. N. Bartlett of Portland.

Wash., Anacortes—The city council has decided to authorize the largest paving project ever done in Anacortes. The work will cost about \$115,000 and includes 3rd Street to 9th Street and F, X, M and N Avenues.

Wash., Pullman—The city plans to cooperate with the state to continue the sewer for about a mile farther and build a new septic tank and disposal beds at a cost of at least \$50,000, bonding the city for their share.

Waterworks

Calif., Chico—At an election held on March 3, for the purpose of deciding whether or not the city would take over the three water companies in this district and provide \$475,000 in bonds for the purchase of same, the voters approved the purchase of the three separate units but the bond issue failed to carry. As the money cannot be raised by taxation, which would carry the city beyond its legal limit of indebtedness, petitions are again being circulated for another bond election.

Calif., Los Angeles—Public service commission, water department, has received a communication from the Sawtelle chamber of commerce, asking for a solution of the water problem in that district. Bonds in the sum of \$275,000 were recently voted, but owing to legal difficulties, the funds will not be available for a year or more. In the meantime, the chamber petitions the commission to secure a temporary loan to finance the construction of a water system in the Sawtelle district, recently annexed to Los Angeles. Wm. Mulholland, chief engineer, water department, states that the water system in use at that point is antiquated and inadequate. The matter was referred to the legal department for report.

Calif., Ventura—\$250,000 Ventura water bond election passed by a vote of 9 to 1. \$220,000 will be spent for the purchase of the Edison company's water system.

Ore., Vernonia—All bids for the construction of the new \$40,000 water system were rejected because they did not come within the limit desired by the city council. A few changes have been made in the plans by Stiger & Lincoln, consulting engineers of Portland, and re-advertisement for bids has been ordered by the council.

Wash., Everett—City council has under consideration the plans for the proposed new water reservoir, and bids will be called for shortly for the big project. Plans call for a basin 400 ft. square, 22 ft. deep, concrete lined; an adequate

system of sub-drainage; a 20,000,000-gallon reservoir, with water surface of about 160,000 sq. ft. Excavation necessary before lining is estimated at 175,000 yd. External equipment included in plans consists of a control house, baffle spillway and outlet and intake lines. The project, completed, is estimated to cost \$350,000, for which a bond issue has been voted.

Wash., Kelso—The Long-Bell Lumber Company has applied for the right to appropriate water from the north and south forks of the Goble River under a construction program involving an expenditure of \$663,445. Two dams will be built and the water will supply the city of Longview as well as the huge lumber mill.

Miscellaneous

Calif., Santa Barbara—City council has tentatively approved the project to bond the city for the purchase of the Ambassador grounds, for a public park, at a cost of \$250,000. George S. Edwards of the chamber of commerce has been asked for a detailed report regarding the project.

Calif., San Diego—Union Oil Company has purchased a tract of land from H. S. Kibbey Lumber Co., Lakeside, adjoining the lumber yard, and will erect structures and storage tanks for a district oil station. Construction will begin at once. The storage facilities will include four tanks with a combined capacity of approximately 80,000 gal. gasoline. There may possibly be added another tank for distillate. A high wire fence will enclose the plant. The district station will be moved from El Cajon as soon as the buildings are ready for occupancy.

Calif., Fullerton—Orange County Brick & Tile Co. has been recently incorporated and financed by Fullerton capital and plans to erect a brick and tile plant south of the Fullerton pumping plant. The plant will have a capacity of approximately 40,000 brick a day, and will cost \$50,000. The men back of the project are: F. C. Krause, J. W. Carmichael and J. J. Lilley.

Calif., Los Angeles—Los Angeles harbor commission has given the Shell Oil Company of California, a 21-year lease on 6.7 acres on Mormon Island at the harbor for an oil exporting station. The city will build an open wharf at a cost of \$100,000 and the oil company will spend several hundred thousand dollars erecting storage tanks. The city will receive a rental of \$4,674 a year and a fee of $\frac{1}{2}$ cent per barrel on all oil handled over the wharf. This, with other city charges, will in a few years, it is said, reimburse the city for the cost of 5.1 acres included in the lease purchased from Hancock Banning at a cost of \$256,250.

Calif., Sacramento—The Pratt Rock and Gravel Company, recently organized by Clarence F. Pratt, president of the Pratt Building Material Company, soon will build a \$200,000 rock and gravel crushing plant between Sacramento and Folsom, near the Placerville branch of the Southern Pacific Railroad, according to a recent announcement.

Colo., Denver—A fifty per cent conversion to central station service will be effected in the remodeling of the Masonic Temple about April 1. The first two floors will be torn out and entirely remodeled at a cost of \$200,000. Main wiring service will be provided to tenants by the building association but the former will be required to install all sub-service, lighting fixtures and window lighting arrangements.

Wash., Wenatchee—The Great Northern Railway is planning to build a new freight depot beginning work about the first of April. The building will be 50 x 300 ft. and is to be located on Thurston Street, south of the passenger station. The company is also planning the remodeling of the passenger station and paving and curbing of the station surroundings. The grounds are to be beautified.

Journal of Electricity and Western Industry

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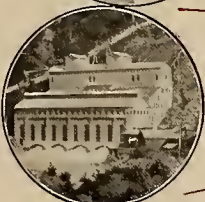
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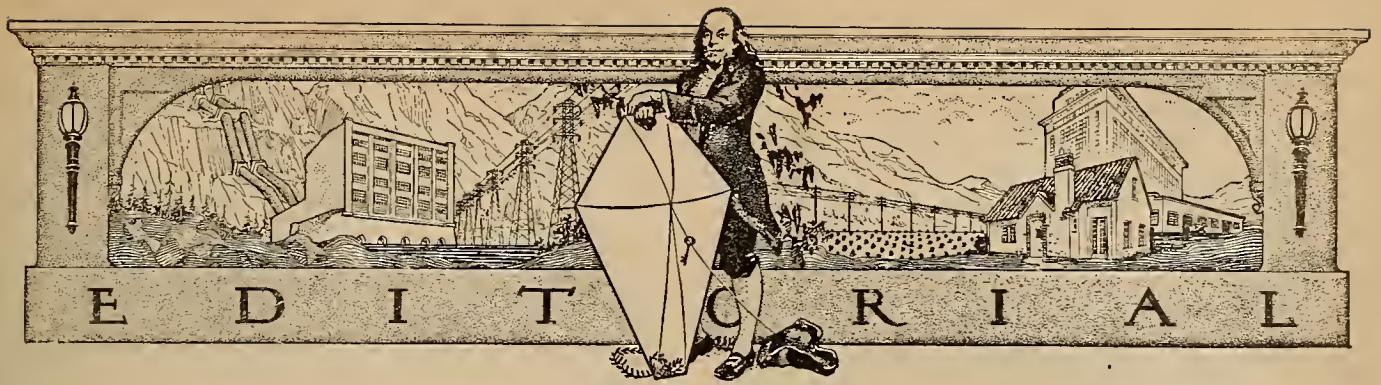
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Westward the Course of Empire Takes Its Way

GOLD was discovered in California in 1848. Climate was discovered some years later. Both have caused many people to emigrate to that state and were generally supposed to be the state's only products. During the past few years many other factors have contributed to turn the eyes of the nation toward the Pacific. Widely diversified agricultural products, large petroleum resources and an abundance of hydroelectric energy are but a few of the things that brought prosperity to California when the remainder of the country was in depression. Today California and the western states are being re-discovered. In agriculture, industry and living conditions, the West is looked upon as the land of opportunity.

WESTERNERS have never been accused of modesty in describing the wonders of their own country. The most irritating of all braggarts is the man who is telling the truth and the nation has seen extravagant statements about the West proved by cold facts and figures. The echo of the laughter that greeted the most enthusiastic booster's dream would hardly die before the prediction would be fulfilled. The ready acceptance of these facts, once they were recognized, has resulted in an astonishing influx of population. This has been particularly true in southern California. There is every indication that the steady growth of the past will continue at an accelerated rate for many years to come.

ONE of the functions of a public utility supplying electric energy is to see that the growth of the territory which it serves is not retarded by lack of power. This means

that careful plans must be made for many years ahead, that construction of plants, transmission and distribution lines and substations be so co-ordinated that power will be ready when needed.

CALIFORNIA has been endowed by nature with an abundance of water power capable of being put to beneficial use in the development of electric energy, but this potential power is not easy of access. Mountain ranges must be tunneled, giant reservoirs constructed, railroads built and transmission lines hundreds of miles in length be erected before the energy can be utilized. Obviously this takes time and money as well as engineering skill and daring.

THE Southern California Edison Company furnishes electric energy to a district which has practically doubled in population in the past decade. The demand for electricity has increased much more rapidly and in meeting this demand it is today making history in hydroelectric development. In this issue will be found an account of this company's program in connection with construction activities for the next fifteen years involving the spending of three hundred millions of dollars to develop one million four hundred thousand horsepower of electrical energy. An army of four thousand workers is engaged in bringing this about.

YET this project is but a part of a program of hydroelectric development embracing not only the other utilities of California, but those in every section of the West. The West is alive to its obligations. It is building solidly and carefully and its utilities march in the lead of the caravan of progress.

Much Needed Revision of National Electric Code

THE eyes of the electrical industry have been turned toward New York during March where the National Electric Code has been receiving a much-needed revision at the hands of the electrical committee of the National Fire Protection Association. Following a public hearing conducted by this committee on March 12, at which time criticisms and suggestions of proposed changes were taken up, recommendations for adoption of proposed amendments to the National Electric Code were made. The important modifications are substantially those printed in a bulletin issued well in advance of the public hearing and which has been received with nation-wide interest.

Important among the changes recommended are the abolition of the "660-watt rule" and the permission to increase the branch-fuse limit from 10 to 15 amp., the only limitation of a circuit being a maximum of 12 outlets per circuit. Solid unfused conductors on the grounded sides of branch circuits with a fuse only in the one undergrounded side of the circuit are approved by the new code subject to the permission of the local inspection department.

The new addition to the code which is to be printed during the coming summer, will contain a new arrangement making it easier to understand and refer to.

The National Electric Code, which has been compiled rather haphazardly, has grown to such size and is now of such importance that the electrical industry will welcome this revision not only of important clauses but of its manner of compilation.

Business Barometers Indicate Approaching Period of Inflation

SO RAPID has domestic business expansion become during the first quarter of 1923 that the best previous records are being surpassed in different instances. Demand for the principal raw materials produced in the eleven western states, excepting agricultural products, is equal to or in excess of the available supply, prices of these commodities tending toward higher levels. Increasing distributive activity has accompanied expanding production. In fact, all indications point to a period of inflation comparable with that immediately following the war.

Increased production has caused a shortage of labor in many industries and wages and living costs have risen accordingly. Building activity has not declined during the winter months and undoubtedly will increase during the spring months. A long period of good business and reasonable prosperity may be expected in all related lines provided an increased demand for building materials does not bring on an unwarranted inflation in prices with the inevitable reaction and depression.

It would seem that the era of prosperity which everyone has been looking forward to for the past few years has arrived. The industry should bear in mind the lessons of the past, and that depression follows inflation as day follows night. The foremost

economists agree that provided serious disruption does not occur, we can look forward during the next ten years to constantly recurring periods of inflation and depression, each being milder than its predecessor, before economic conditions are stabilized.

The electrical industry of the West in all its varied branches has a particularly bright future before it. This is a growing country whose resources are just beginning to be appreciated by the rest of the country. The industry should set its house in order to meet a situation which promises to test to the utmost its ability to handle an amazing growth in a logical and orderly manner.

Public Opinion Is the Governing Force in Public Utility Affairs

IN THE conduct of a public utility business, public opinion is the great moral force. The time is at hand when public understanding and cooperation between utilities and their customers must be established and maintained. Practically everyone in the communities served finds that electricity is entering into his daily life more and more. The interest of the average consumer in the utility serving him is governed by his attitude toward the service rendered. Enlightenment of consumers is the requirement today upon which depends future success of all public utilities. Consumer cooperation leads to mutual benefits and demands a more direct assumption of responsibility by all concerned.

Advertising is an important feature of the general cooperative plan which will better acquaint customers and prospective customers with utility policy and the products which it has for the convenience and use of the public. The problem is to reach the people so that they may be correctly informed and that public opinion, thus enlightened, may move in the direction of assisting the utility to better perform its tasks. If a utility will do its part in forming favorable public opinion, either through advertising or otherwise, its problems will be more easily solved, and consumer, utility and community will prosper together.

Customer ownership of public utility securities is another method of stimulating a sympathetic understanding of utility matters. Financial and business publications generally, and a large number of national magazines of general circulation, are showing great interest in the growth of the customer ownership of securities movement.

Among the financial publications taking an interest in this is Forbes Magazine, which has offered \$1,000 in prizes for the best letter replying to the question: "What are the benefits of Customer Ownership of Public Utilities?" This is an attempt to get the customer-owners' side of the new relationship between producer and consumer.

At a recent dinner in New York, officials of a number of electric light and power concerns, comparing figures and estimates, arrived at a total of \$175,000,000 as the aggregate of stocks sold during 1922. And a leading investment bond house estimates total sales of \$550,000,000 in bonds—a grand

total of \$725,000,000. Customers now own 1,320,000 shares of stock in 84 central station companies which have reported, out of 200 engaged in the sale of securities to customers. One customer out of every 18 now owns stock, and the average purchase is 7 shares per stockholder.

Radio Corporation President Is Optimistic as to Future of Industry

GENERAL JAMES G. HARBORD and David Sarnoff, respectively president, and vice-president and general manager, of the Radio Corporation of America, recently visited the Pacific Coast in the interests of their company. Those who had the pleasure of hearing these gentlemen in public addresses obtained a vivid and optimistic picture of the future of radio development.

General Harbord, in an interview printed elsewhere in this issue, likens the radio industry of today to the automobile industry of twenty years ago. He predicts a development of equal magnitude. He also says that the average electrical dealer is not equipped and prepared to merchandise radio equipment.

Radio is undoubtedly a subject of prime importance to the electrical dealer. The merchandising, distributing and manufacturing branches of the industry will undoubtedly become stabilized in the immediate future. There is a danger that the music and department stores will dominate the field unless the electrical dealer wakes up to his opportunities.

Map of Interconnected System Has Wide Application

THE revised map of the interconnected hydroelectric systems of the West, published as a supplement to the February 1 issue of the Journal of Electricity and Western Industry, has received favorable commendation from many sources. Requests have been made for copies from hundreds of individuals and organizations. Chambers of Commerce, manufacturers, bond houses, engineers and others are all using it to help tell the story of western growth and progress.

Among the interesting uses to which this map has been put was a window display featured by Strassburger & Company, investment security dealers of San Francisco, in defense of the power companies of California. Radical newspapers in California have been making capital out of statements as to expenditures in connection with the campaign to defeat the late unlamented Water and Power Act in that state. Under the caption "Faithful Stewards" the following text appeared:

"The accompanying map should give pause to those who have been turning up the whites of their eyes in holy horror at the news concerning the sums disbursed by the Public Utility Companies in order to protect the property of their shareholders—mostly men and women of moderate means—from politicians out for loot.

"The map shows what has been accomplished by men of ability and large vision, with the help of the

savings of the common people. Work that has placed California on record as the most enterprising state in the Union, that has spread her fame throughout the world.

"If a burglar announces his intention to pay you a night visit with an empty sack, and you know also that he proposes to depart with a full one, is it to be regarded as a crime to buy a gun and use it? If the property which he proposes to take away is not your own but is held in trust for others, the purchase of the gun would seem not only not criminal, but an obvious duty.

"The managements of the Public Utility Companies of California have spent a small portion of the surplus funds saved by them (as a wise precaution) out of what you have invested in the properties shown here—against a rainy day. The rainy day came in the form of a raid on your property, and they used a portion of these funds to protect your much larger interests.

"That is all, and they are entitled to our thanks."

Engineers, Scientists, and Editors Plan to Standardize Symbols and Abbreviations

A RECENT conference held in New York City under the auspices of the American Engineering Standards Committee revealed a sentiment among engineers, scientists, government officials, business paper editors, and industrial executives, emphatically in favor of the unification of technical and scientific abbreviations and symbols.

It was agreed on all sides that the standardization of abbreviations and symbols would result in inestimable mental economies. The present situation with respect to the use of abbreviations and symbols in engineering, scientific, and other technical fields is comparable to a language which has degenerated into a multiplicity of dialects each of which has to be translated for the users of the others. Abbreviations and symbols constitute an ever growing and important part of the language of engineers, scientists, industrial editors, and other technical men.

The conference was called upon requests from the American Institute of Electrical Engineers, the American Society of Mechanical Engineers, and the Association of Edison Illuminating Companies, to consider abbreviations and symbols, but after some discussion of the subject it was thought desirable to include as a part of the project, the graphical symbols which are used in engineering drawings, diagrams, and the like, for representing instruments and apparatus and components of them.

It was agreed that the cooperation of foreign standardizing bodies should be sought, in the development of the work. The importance of international uniformity in symbols is great on account of the international character of much engineering and scientific work, and the importance of reference books and periodicals in foreign languages.

The work will go forward under a committee organization developed in accordance with the rules and procedure of the American Engineering Standards Committee.

CURRENT COMMENT



The failure of the Arizona State Legislature to ratify the Colorado River pact before adjournment has resulted in a political tangle which threatens to nullify the efforts expended by

Colorado River Pact Threatened By Politics

Secretary Hoover and the Colorado River Commission in framing a treaty which would prove satisfactory to the seven states who are concerned with the distribution of the waters of that stream. Seemingly, development of the river for flood control, irrigation and power purposes is still a dream of the far distant future.

Of chief importance among the developments resulting from delayed action on the treaty is the statement from the Federal Power Commission that applications on file for projects on the river will be held in abeyance until the pact meets with approval from all of the states and from Congress. Numerous applications are on file at the present time and during the past fortnight two additional ones have been placed before the commission for projects at Boulder Canyon.

In Arizona itself the political pot has been upset with a vengeance. Governor W. P. Hunt has announced that the office of State Water Commissioner will be vacant after March 31, 1923. This office is held by W. S. Norviel, who was a member of the Colorado River Commission and one of the framers of the pact. In his letter, Governor Hunt has declared that Commissioner Norviel is being ousted because he did not take proper steps in securing data on the Colorado River previous to the negotiation of the compact. In political circles of the state it is rumored that the action of the governor is the result of party politics.

The League of the Southwest, whose membership consists of 3,000 organizations in the seven Pacific Southwest states, has also taken a hand in the situation. Through Arnold Kruckman, secretary-treasurer of the league, invitations have been issued to the governors of these states to attend a meeting in Santa Barbara, Calif., May 18 and 19, to discuss the formulation of a new pact. In his telegrams to the various governors, Mr. Kruckman says:

"The conference is called at the request of units in the northern states, as well as in the south, to discover whether comprehensive discussion may reveal a broad basis upon which another Colorado River pact may be formulated, in place of the Hoover treaty, killed in Arizona. Cabinet officers, congressional delegations and distinguished representatives of great interests involved will participate, and attendance will be heavy in numbers, substance and influence.

"We are making an effort to secure full, fair and exhaustive discussion, such as is necessary to formulate a treaty

unanimously agreeable, and we will deeply appreciate your interested cooperation."

The proposed meeting has not met with unanimous support, as is indicated in the replies of Governor Richardson of California and Governor Scrugham of Nevada. The California governor in declining to take part in the conference has said:

"Fail to understand your authority in calling conference and do not understand Arizona has nullified Colorado pact."

Governor Scrugham has also declined to participate in the meeting. His reply to Mr. Kruckman follows:

"Replying to your wire of March 10, 1923, we do not concede or understand that the Colorado pact has been nullified by the failure of the Arizona Legislature to ratify.

"You have neither the standing nor the authority to make or initiate any kind of a pact, and I am at a loss to understand your connection with the problem.

"There will be no official representation at your meeting from this state."

There has been some hope that Governor Hunt of Arizona would call a special session of the State Legislature for consideration of the pact. It seems certain that Arizona will demand a clause in the treaty which will give that state a right to tax all power produced from developments on the Colorado River within the state.

That electricity is a potent factor in fire prevention and that it has reduced the number of fires in Denver by more than 95 per cent in the last five

Electricity to Blame For Few Fires in Denver

years on account of its application in the household and industrial world, is the declaration made by the chief of the Denver fire department in the newspapers of that city as a result of a survey made by his department at the behest of the Electrical Co-operative League. In his statements, the chief of the fire department said:

"The increasing demand for electricity for heat, light and power purposes in place of steam, gas and coal has curtailed the number of fires at least 95 per cent and perhaps an even higher figure. In short, not more than one fire in 1,000 is caused by electricity when used properly."

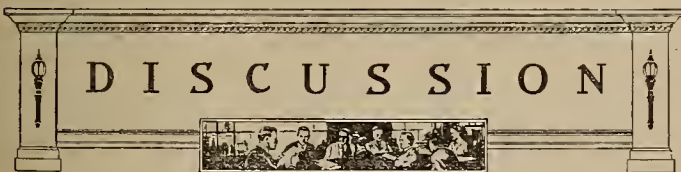
He grouped the few fires of electrical origin which have occurred in the following three general classes: fires over which ordinary precautions exert little control, such as conflagrations due to interferences with transmission lines by falling trees, lightning, storms and static electricity; fires caused by abuse and carelessness in the use of electric appliances, and lastly, tampering with fuses, deterioration of installations and defective equipment:

Twenty-four conflagrations occurring in Denver during the course of two years which were blamed to electricity, have been proved by the department to have resulted from other causes entirely. The statement issued by the chief of the department continues:

"Results of our investigations convince us that it is not the use of electricity that causes the fires, but rather its misuse. Electricity, when properly applied, is one of the most effective agencies in minimizing the fire liability, although many careless persons are inclined to blame their fire losses to electricity without making an investigation."

It is pleasing to note the steps which are being taken in the various localities to overcome the popular tendency to blame electricity for fires in which the cause cannot be readily ascertained. The Denver Electrical Cooperative League deserves commendation for the steps which it has taken to secure the cooperation of the local chief of the fire department to dispel this myth.

In planning its activities for 1923, The Electrical League of Cleveland has divided the industry into four natural groups or sections, somewhat similar to the organization of the Joint Committee for Business Development. These groups are the wiring section, lighting section, appliance section, and industrial power and heating section. The wiring section plans among its activities to distribute booklets of wiring suggestions to all who take out permits for dwelling buildings, and encourage home builders to bring their plans to the league for expert advice on wiring and lighting the home. Contact will be maintained with architects, building contractors and wiring contractors, and the section will work in cooperation with the lighting section for the betterment of lighting conditions in new and already-built structures.



Takes Issue with Communication on Subject of Heating Homes by Electricity

To the Editor:

Sir: I have read with interest in your issue of Jan. 15, 1923, the following:

1. A communication on page 47, from A. C. McMicken of the Portland Railway Light & Power Company, that commends an article signed by S. H. Graf, of Corvallis, Ore., in which the latter claims it is impracticable to use electricity for heating purposes, because of its being too expensive to do so, etc.
2. Your reply on page 42, in which you treat the matter dispassionately and point out that: "Electric heating should not be unwisely discouraged."

The modern practice of railroads and other transportation lines, of giving a rate of freight on

certain commodities that is lower than is charged for other articles, is well established as being both desirable and necessary, and a vast part of the business of the country is handled upon this basis, which leads many people to feel that the sale of electric energy ought to be governed by a policy as to differential rates, which will encourage and justify its general use for heating and cooking, as well as for power and light.

In my opinion, the people desire an opportunity to use electric energy for supplying heat in a more general way than is done now, therefore, privately owned utility corporations such as the Portland Railway, Light & Power Company, are but arousing in the mind of the public a demand for electric plants which are public owned, when the said privately owned utility corporations fail to render a service in this respect which the public feels is based on fair rates.

Tacoma, Wash., has been foremost in granting low rates for heating purposes and, as it is an axiom that a city which cannot do business as cheaply as any other city will be surpassed by its rivals, may this not be applied to hydroelectric plants, whether they be privately owned, or publicly owned?

The aforesaid communication which bears the signature of Mr. Graf, presents with clearness the point of view of some of the privately owned utility corporations upon the subject that is discussed therein, and, while it may be true that he is not employed by the utility corporation with which Mr. McMicken is associated, it is nevertheless a fact that the former devotes a considerable part of his time each year to the service of the Portland Gas Company, a subsidiary of the Pacific Power & Light Company, which also owns and operates several electric plants in the Northwest, hence to those who are aware of this, it is surprising to read in the above mentioned communication from Mr. McMicken that:

"To my mind, the answer is a fitting one, coming as it does unsolicited and from a man (Mr. Graf) not in the employ of an electrical utility company."

Portland, Ore.,
March 3, 1923.

W. F. BURRELL.

Error as to Date Is Noted in Recent Editorial on Carrier Current Demonstration

To the Editor:

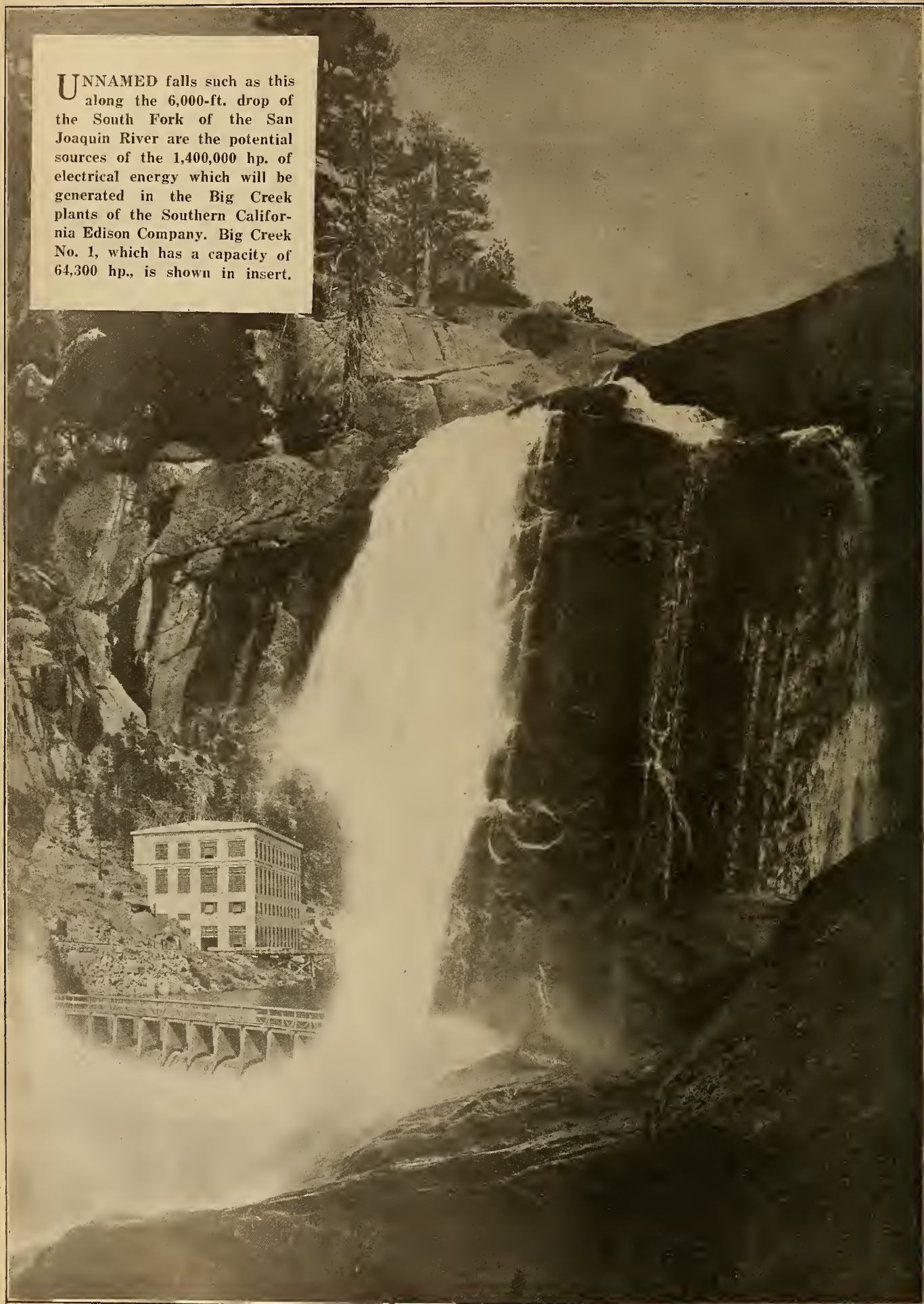
Sir: I read with much interest the editorial in the March 1, 1923, issue of "Journal of Electricity and Western Industry," captioned: 'Carrier Current Demonstration of Interest to Power Companies.'

The last paragraph of your editorial is in error, in that automatic switching was accomplished on a ship, equipped by the Radio Corporation of America and the General Electric Company, more than a year ago when conversation was carried on automatically between officials of the American Telephone & Telegraph Company, Radio Corporation of America and the United States Shipping Board, located in New York City and Connecticut, through the transmitting and receiving stations of the American Telephone & Telegraph Company, located on the New Jersey Coast.

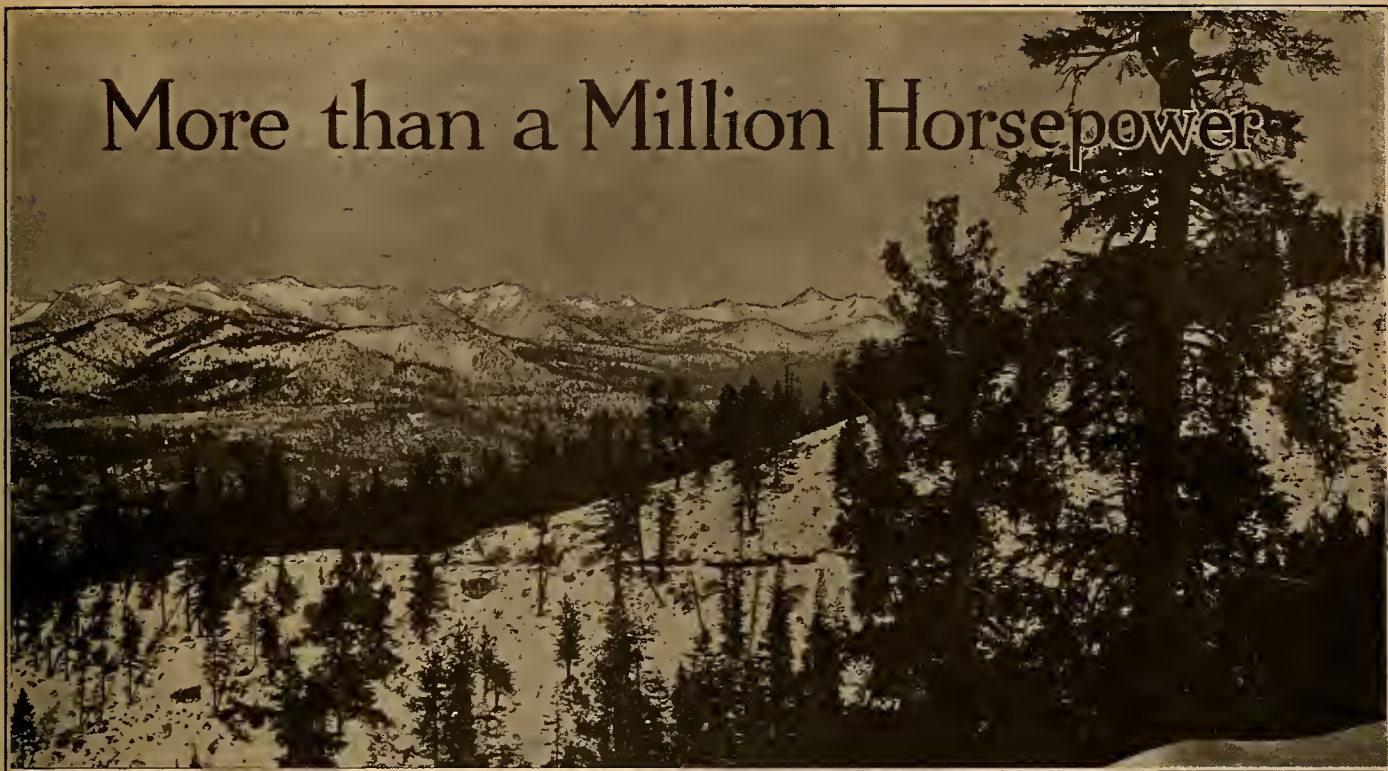
ARTHUR A. ISBELL,
General Superintendent,
Pacific Division,
Radio Corp. of America.

San Francisco, Calif.,
March 7, 1923.

UNNAMED falls such as this along the 6,000-ft. drop of the South Fork of the San Joaquin River are the potential sources of the 1,400,000 hp. of electrical energy which will be generated in the Big Creek plants of the Southern California Edison Company. Big Creek No. 1, which has a capacity of 64,300 hp., is shown in insert.



More than a Million Horsepower



GROWTH and expansion of California is closely linked with the ability of the large public utility companies to construct additional generating stations to meet the ever-increasing power demands of the state. Community life and community development, insofar as power is a part of their requirements, are based upon an adequate and dependable supply of electrical energy. Thus it is that the electric power systems have become the great community engines. Imagine, if you will, such an engine, which during 1923 will be capable of generating 500,000 hp., to which there is being added unit after unit to keep up with the rapidly growing power demands of the territory which it serves. Such a community engine is the Southern California Edison Company, engaged at the present time on a development program embracing 1,400,000 hp. to be generated from the waters of Big Creek and the San Joaquin River,—a project involving the expenditure of approximately \$300,000,000 over a period of fifteen years.

Serving as it does a territory equal to the entire area of the states of Vermont, New Hampshire, Connecticut, Rhode Island, New Jersey, and Delaware, the Southern California Edison Company produces 80 per cent of the power used in Los Angeles and the contiguous territory and must be depended upon to supply 85 per cent of the hydroelectric power yet to

By George C. Tenney

IN its Big Creek-San Joaquin River hydroelectric project where approximately \$300,000,000 is being spent to produce and market 1,400,000 hp. of electrical energy, the Southern California Edison Company is keeping abreast of the ever increasing power demands of the rapidly growing territory to which its service extends.

the population of the territory served by the Southern California Edison Company has increased over 300 per cent while the company has increased its generating capacity from 12,000 hp. in 1900 to 500,000 hp. in 1923. However, the real story of development of the company goes back another decade.

In fixing the date of its historical beginning, the Southern California Edison Company may be said to have originated with the Redlands Electric Light & Power Company in 1892. This company, with its small hydroelectric plant on Mill Creek, was the first in the world to transmit hydroelectric energy from the point of generation to the load center at a voltage higher than that at which the energy was generated. It has always been considered, however, that the company started in 1895 with the formation of the West Side Lighting Company of Los Angeles, whose first plant consisted of an 80-hp.

be developed within the state for use in the southern half. This company's growth, the use to which the power is put, together with its extensive plans for future development, are typical of the expansion and growth of southern California itself, for there, as perhaps in no other section of the country, population and industry have grown coincidentally with the science of generating and transmitting electric power. For example, during the past two decades

engine and boiler and a thirty-light arc-lighting dynamo. The total connected load in December of that year was five commercial arc lights and three street arcs. The early development of the company was fraught with difficulties. Unable to secure a franchise from the City of Los Angeles, the company

manufacturing. Lighting consisted of municipal as well as private arc and incandescent lighting; agriculture consisted chiefly of pumping for irrigation; railroads were requiring additional power to operate city and interurban lines, and manufacturing had grown until 4,200 plants, representing a total of

Table I—Capacity of Present Power Houses and Date When Placed in Operation.

| Power House | Placed in Operation Year | Initial No. of Units | Installation Hp. | Present No. of Units | Installation Hp. |
|---------------------------------|--------------------------|----------------------|------------------|----------------------|------------------|
| Mill Creek No. 1..... | 1893 | 3 | 1,000 | 3 | 1,000 |
| Azusa..... | 1898 | 5 | 2,000 | 5 | 2,000 |
| Santa Ana No. 1..... | 1898 | 4 | 4,000 | 4 | 4,000 |
| Kaweah No. 1..... | 1899 | 3 | 1,800 | 3 | 1,800 |
| Mill Creek No. 2..... | 1899 | 2 | 600 | 1 | 300 |
| St. Barbara Steam..... | 1900 | 1 | 400 | 0 | 0 |
| Sierra..... | 1901 | 2 | 800 | 2 | 800 |
| St. Barbara Steam..... | 1901 | 1 | 400 | 0 | 0 |
| Mill Creek No. 3..... | 1903 | 4 | 4,000 | 4 | 4,000 |
| Santa Ana No. 3..... | 1904 | 1 | 2,000 | 1 | 2,000 |
| Lytle Creek..... | 1904 | 2 | 700 | 2 | 700 |
| Borel..... | 1904 | 5 | 13,400 | 5 | 13,400 |
| Kaweah No. 2..... | 1905 | 3 | 2,000 | 2 | 2,300 |
| Santa Ana No. 2..... | 1905 | 2 | 1,300 | 2 | 1,300 |
| Visalia Steam..... | 1906 | 1 | 1,300 | 1 | 1,300 |
| Kern River No. 1..... | 1907 | 4 | 26,800 | 4 | 26,800 |
| Redondo Steam..... | 1907 | 3 | 20,000 | 0 | 0 |
| St. Barbara Steam..... | 1909 | 1 | 400 | 0 | 0 |
| Tule River..... | 1909 | 2 | 2,700 | 2 | 2,700 |
| Redondo Steam..... | 1910 | 1 | 16,800 | 0 | 0 |
| Redondo Steam..... | 1911 | 1 | 16,800 | 5 | 53,600 |
| Long Beach Steam..... | 1911 | 1 | 16,800 | 0 | 0 |
| Visalia Steam..... | 1912 | 1 | 1,000 | 0 | 0 |
| Long Beach Steam..... | 1913 | 1 | 20,000 | 0 | 0 |
| Kaweah No. 3..... | 1913 | 2 | 3,800 | 2 | 3,800 |
| St. Barbara Steam..... | 1913 | 1 | 1,300 | 3 | 2,500 |
| Big Creek No. 1..... | 1913 | 2 | 42,900 | 2 | 42,900 |
| Big Creek No. 2..... | 1913 | 2 | 42,900 | 0 | 0 |
| Long Beach Steam..... | 1914 | 1 | 26,200 | 3 | 63,000 |
| Visalia Steam..... | 1914 | 1 | 5,400 | 3 | 7,700 |
| Fontana..... | 1917 | 2 | 2,400 | 2 | 2,400 |
| Big Creek No. 2..... | 1921 | 1 | 21,400 | 3 | 64,300 |
| Kern River No. 3..... | 1921 | 2 | 42,900 | 2 | 42,900 |
| Big Creek No. 8..... | 1921 | 1 | 30,200 | 1 | 30,200 |
| Total—Present Installation..... | | | | 67 | 376,400 |

installed poles on private property and began serving consumers inside the city limits. Discovering an old franchise which had been granted many years before and which had never been used, the company officials immediately purchased it, only to find that their troubles had just begun. Under the terms of this franchise they were to furnish lighting to the city hall and they had but two weeks to comply with these terms. By almost superhuman efforts on the part of all their men, wires were strung on the poles of the street railway company, and by bridging the last gap of a block with wires strung on a "horse" set on the roof of a building, a light was burning in the city tower twelve hours before the franchise would have become null and void.

From that time on, the growth of the company and the territory it served went forward by leaps and bounds. By a series of consolidations, the properties of the Southern California Power Company were taken over in 1898, bringing the Mill Creek and Santa Ana River plants into the system. In 1902, the Edison Electric Company was organized with a capitalization of \$10,000,000. In the same year Lytle Creek and the Kern River systems were acquired. By 1907 the several hydroelectric plants taken over from the various companies had been completed, including Kern River No. 1 with its generating capacity of 20,000 kw. In 1909 the present company was incorporated. The program of consolidation uses to which this electrical energy was being applied, namely: lighting, agriculture, railroads and

TABLE II—Connected Load in Horsepower Jan. 1, 1922

| | Hp. |
|--|---------|
| Lighting..... | 172,540 |
| Pumping Plants for Irrigation..... | 154,532 |
| Cement Mills and Rock Crushing..... | 21,035 |
| Railway..... | 109,881 |
| Municipalities for Resale..... | 76,984 |
| Municipalities for Pumping, Sewers, etc..... | 12,413 |
| Ice Making and Refrigeration..... | 5,055 |
| Motion Picture Industry..... | 4,014 |
| Electric Cooking..... | 27,115 |
| Oil Well Development and Operation..... | 9,029 |
| Industrial and Miscellaneous..... | 110,710 |
| Total..... | 706,308 |

eighty industries, had been established in southern California. An idea of the relative magnitude of the different classes of business can be gained from a glance at the connected load for each class, which is indicated in Table II. This total connected load reached its climax in 1917 when the properties of the Pacific Power & Light Corporation,

Table III—Miles of Wire Comprising Edison System

| | |
|--|--|
| TRANSMISSION LINES AS OF DEC. 31, 1922 | |
| 482 miles of 150,000-Volt Transmission Lines | |
| 1,267 miles of 60,000-Volt Transmission Lines | |
| 198 miles of 30,000-Volt Transmission Lines | |
| Total 1,947 miles of 3-wire Transmission Lines | |
| or 5,841 miles of single-wire Transmission Lines | |
| DISTRIBUTION LINES AS OF DEC. 31, 1922 | |
| 9,110 miles of primary wire | |
| 5,343 miles of secondary wire | |
| 1,483 miles of street light wire | |
| 28 miles of underground cable | |
| Total 15,964 miles of distribution wire | |

including the famous Big Creek plants, were acquired. Table No. I shows the chronological growth of the company's generating plants.

Back of this rapid expansion and development were the ever increasing demands of a rapidly growing population for more power. There were four

Table IV—Growth in Number of Meters

| Year | Number of Meters |
|-----------|------------------|
| 1900..... | 44,445 |
| 1910..... | 53,338 |
| 1911..... | 66,398 |
| 1912..... | 80,995 |
| 1913..... | 96,851 |
| 1914..... | 108,439 |
| 1915..... | 116,768 |
| 1916..... | 124,019 |
| 1917..... | 201,129 |
| 1918..... | 214,528 |
| 1919..... | 238,269 |
| 1920..... | 302,659 |
| 1921..... | 318,795 |
| 1922..... | 318,795 |

of 706,308 hp., on account of its diversity of character, is served by a maximum system demand of only 320,000 hp. This is made possible by the diversified requirements of agricultural, industrial and domestic service and the extent and varied character of the territory served.



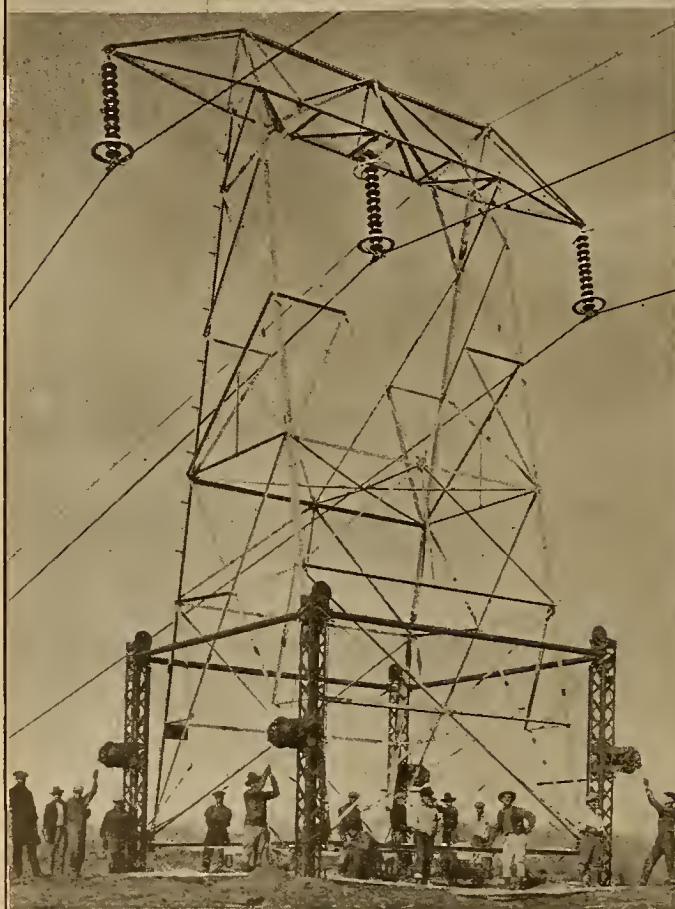
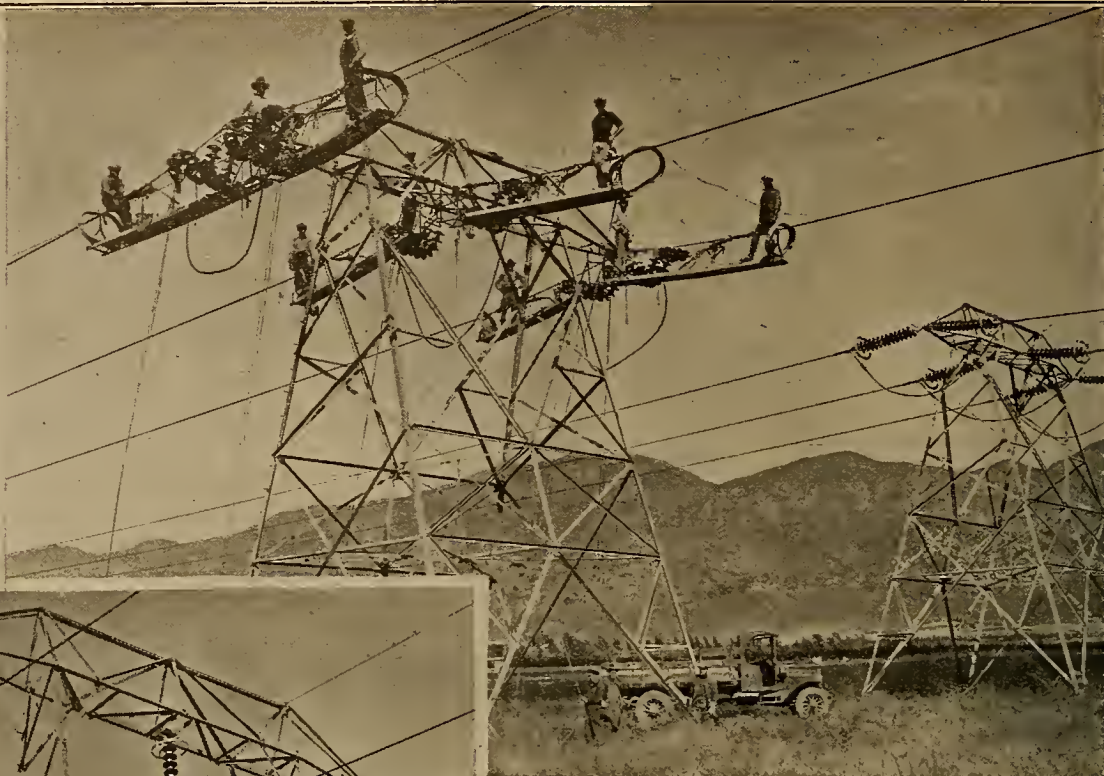
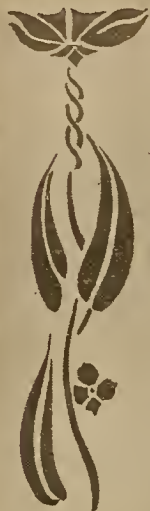
Map showing the section of southern California served by the Southern California Edison Company, whose network of wires is almost sufficient to encircle the globe once.

Coincident with this growth in load and generating capacity, there has been an expansion of transmission and distribution lines until the Southern California Edison Company is now distributing its power in the ten counties of Los Angeles, Orange, Riverside, San Bernardino, Ventura, Kern, Tulare, Kings and Fresno, with a total population of 1,500,000. From Redlands on the east to Santa Barbara on the west, the territory served extends 150 miles, while the distance from Visalia on the north to Capistrano on the south, is 210 miles. The City of Los Angeles, in addition to being served by the Southern California Edison Company on a wholesale basis, is also partially served by the Los Angeles Gas & Electric Company and the Bureau of Power and Light of the city. The extent of the territory served is shown on the accompanying map while the network of wire covering it, almost long enough to reach around the world once, is shown in Table III. Growth in the number of meters installed on the system is shown in Table IV.

This territory, as has been shown, is growing rapidly and expanding both agriculturally and industrially. Although the Southern California Edison Company supplies power for the irrigation of 550,000 acres of land at the present time, there yet remains in the territory served, over a million acres capable

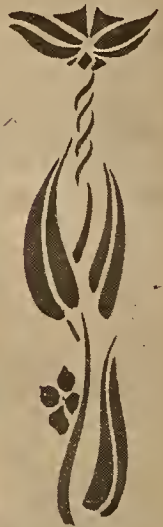
of being irrigated by electrically pumped water, representing a potential connected load of 250,000 hp. Three hundred kilowatt-hours of electrical energy used yearly in the irrigation of one acre of land increases its sale value from \$30 to \$225 an acre and yields an annual return of from \$50 to \$100 in crops. Consideration of this fact leads to the conclusion that the use of electric power for irrigation requirements will expand until every available acre for which there is water will be brought under cultivation.

Modern standards demand electric service for farm, home and factory. Domestic consumption, which depends upon population, will increase rapidly so long as new appliances continue to make electricity more and more of a necessity in the home. The electrification of certain railroads in southern California is bound to occur when the consumption of fuel oil overtakes the supply. An abundance of raw materials, an expanding and easily accessible market, and adequate transportation facilities are positive assurance of future industrial growth. Electricity is, therefore, the motive power upon which California industries depend,—agriculture, manufacturing and transportation cannot go forward without an adequate supply of electric power. As these industries expand and grow, so does the demand for power increase.

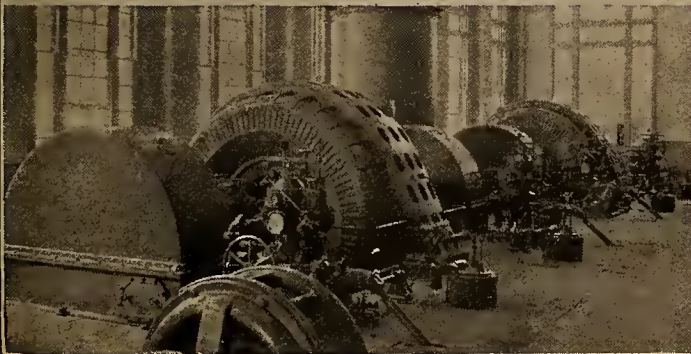


TRANSMISSION of electrical energy over long distances from generating plant to load center has necessitated the use of exceedingly high voltages. The Southern California Edison Company will be the first utility in the world to employ 220,000-volt transmission. The picture above shows a line crew changing the insulators on the Big Creek line for 220,000-volt operation while on the left a crew is preparing to place a 13-ft. extension on one of the towers. Below on the left is a view of one of the distribution substations outside of Los Angeles while on the right is shown the 60,000-volt bus structure at the Vestal substation.





DURING 1923 the Southern California Edison Company will add approximately 120,000 hp. to its generating capacity. Big Creek No. 3 on the main San Joaquin River will be the largest plant on the system. A view of the site of the plant showing the penstock grade and some of the construction activity is shown above. The plant will closely resemble Big Creek No. 2, a view of which is shown on the right. At the end of the present year a total of 258,800 hp. will be represented in the four plants. A view of the interior of Big Creek No. 2 is shown below on the left, while the outlet of one of the many tunnels is shown on the right.



Based upon past consumption of electric energy (Table V) it appears that the rate has been an annually compounded increase of approximately ten per cent. With a continuation of this rate of growth, estimates of the Southern California Edison load have been prepared up to 1928 showing that at that time the connected load served will be 1,500,000 hp.

operated from stream flow alone. This reservoir has a capacity of 88,000 acre-feet and is located 70 miles east of Fresno at an elevation of 7,000 ft. It was constructed at a cost of approximately \$4,750,000.

The drainage area of the streams whose waters will be utilized in the Big Creek plants consists of approximately 1,278 square miles hemmed in by the

TABLE V—Uses to which Electrical Energy Is Being Applied and Their Growth During the Period 1910-1922 in Kilowatt Hours

| Year | Lighting | Agricultural | Railroads | Cement Mills | Industrial and Miscellaneous | Total Sold | % Increase |
|-----------|------------|--------------|-------------|--------------|------------------------------|-------------|------------|
| 1910..... | 37,300,000 | 73,300,000 | 189,700,000 | ..... | 27,700,000 | 328,000,000 | .... |
| 1911..... | 44,100,000 | 72,000,000 | 207,600,000 | 8,900,000 | 31,200,000 | 363,800,000 | 10.5 |
| 1912..... | 50,900,000 | 90,500,000 | 217,400,000 | 37,200,000 | 35,500,000 | 431,500,000 | 18.9 |
| 1913..... | 59,100,000 | 111,000,000 | 236,700,000 | 42,800,000 | 41,300,000 | 490,900,000 | 13.9 |
| 1914..... | 68,200,000 | 102,000,000 | 239,200,000 | 37,700,000 | 47,800,000 | 494,900,000 | 1.0 |
| 1915..... | 74,400,000 | 107,000,000 | 248,600,000 | 30,400,000 | 53,300,000 | 513,700,000 | 3.9 |
| 1916..... | 88,500,000 | 110,000,000 | 247,800,000 | 29,600,000 | 61,000,000 | 536,900,000 | 4.2 |
| 1917..... | 52,700,000 | 129,000,000 | 262,300,000 | 36,900,000 | 130,200,000 | 611,100,000 | 14.0 |
| 1918..... | 34,800,000 | 150,000,000 | 270,600,000 | 31,700,000 | 203,100,000 | 690,200,000 | 13.0 |
| 1919..... | 39,700,000 | 162,000,000 | 254,300,000 | 28,000,000 | 275,200,000 | 759,200,000 | 9.8 |
| 1920..... | 49,300,000 | 168,000,000 | 278,400,000 | 54,700,000 | 242,300,000 | 792,700,000 | 14.6 |
| 1921..... | 57,600,000 | 176,600,000 | 272,200,000 | 54,400,000 | 287,000,000 | 847,800,000 | 7.0 |
| 1922..... | 72,000,000 | 159,900,000 | 283,400,000 | 64,300,000 | 322,300,000 | 901,900,000 | 6.5 |

NOTE: In 1917 the Lighting load went down, while the Industrial and Miscellaneous power load went up. This was due to the operating agreement entered into between the Edison Company and the City of Los Angeles, whereby the load sold by the company for use on the Los Angeles distribution system was put on a wholesale basis and therefore not classified as to ultimate use.

It is upon this analysis of past growth and future needs that the Southern California Edison Company has based its program for development on Big Creek and the San Joaquin River,—a program involving a budget of \$150,000,000 for the seven years, 1922-1928, inclusive. Of this sum, approximately \$24,000,000 was spent during the past year and the remainder will be spread over the next six years, as follows:

| | |
|------------|--------------|
| 1923 | \$26,000,000 |
| 1924 | 14,000,000 |
| 1925 | 23,000,000 |
| 1926 | 20,000,000 |
| 1927 | 20,000,000 |
| 1928 | 23,000,000 |

In order to meet the future demand, a comprehensive survey of the potential power available in the high Sierra within economical transmission distance of the southern California load centers was made several years ago. It was found that there was available for development on the San Joaquin River and its tributaries, 1,400,000 hp., on Kern River, 80,000 hp., and on the Kaweah River, 21,000 hp. Kaweah River has been developed to its ultimate capacity, while 69,700 hp. has been developed on Kern River. Two plants on Big Creek Nos. 1 and 2, were completed in 1913, bringing in a total of 85,800 hp. Big Creek No. 8 was completed in 1921 giving an additional block of power of 30,200 hp. and a third unit has been added to Big Creek No. 2, increasing its capacity to 64,300 hp. During 1923 a total of 122,000 hp. is being developed, 100,000 hp. in Big Creek No. 3 and 22,000 hp. in No. 1. A comprehensive idea of the operating plants of the company, both steam and hydroelectric, can be gained from Table VI.

This early development involved the construction of a huge storage reservoir, Huntington Lake, since all of the Big Creek-San Joaquin plants will be operated with storage, against the Kern River, Kaweah River and other smaller plants which are

highest mountains in the United States. The accompanying map of this drainage area shows the relative locations of the plants and reservoirs comprising the project.

The South Fork of the San Joaquin River rises at elevations of 10,000 to 13,000 ft. and flows down

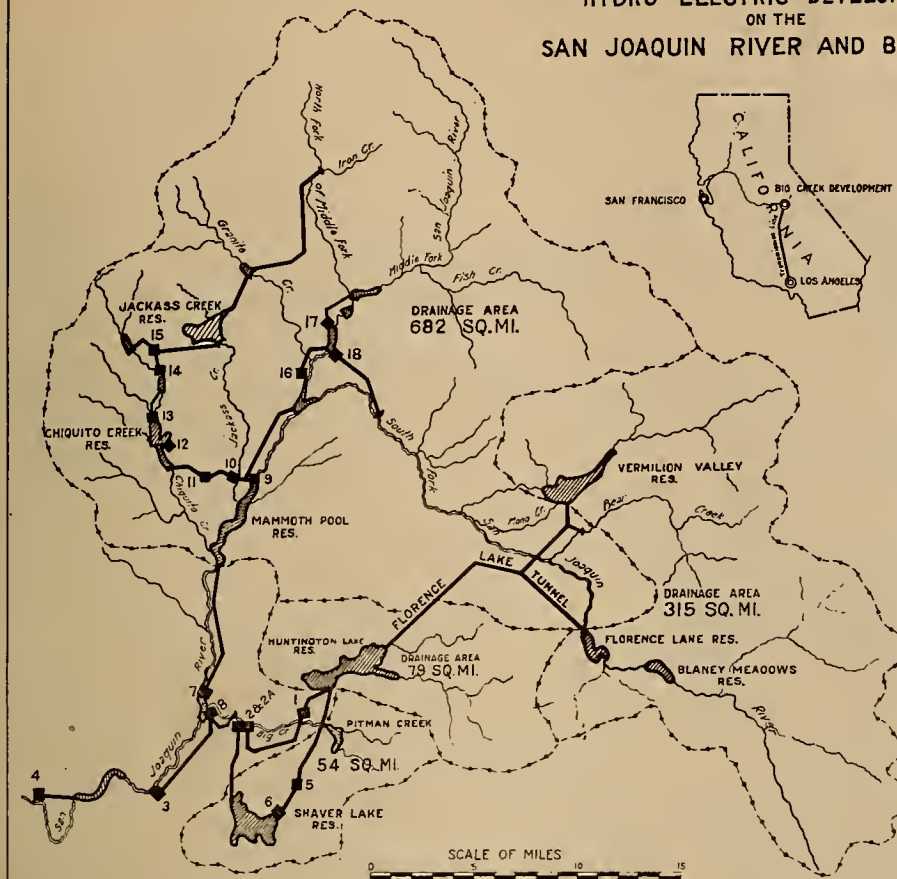
Table VI—Operating Plants—1923

| HYDROELECTRIC PLANTS | | | |
|---|--------------------------------|-------------|-----------------------|
| Big Creek plants operated with water from storage reservoirs. | | | |
| | Installed Capacity Hp.-1923 | Static Head | Kw-hr. Output 1922 |
| Big Creek No. 1..... | 64,300 | 2131 | 159,682,000 |
| Big Creek No. 2..... | 64,300 | 1858 | 191,434,000 |
| Big Creek No. 8..... | 30,200 | 729 | 82,129,000 |
| Big Creek No. 3..... | 100,000 | 830 | ..... |
| Total..... | 258,800 | | 433,245,000 |
| BASE WATER PLANTS | | | |
| Operated from stream flow without storage reservoir. | | | |
| Kern River No. 1..... | 26,800 | 874 | 169,904,000 |
| Kern River No. 2 (Borel)..... | 13,400 | 262 | 56,955,000 |
| Kern River No. 3..... | 42,900 | 800 | 206,834,000 |
| Kaweah No. 1..... | 1,800 | 1287 | 12,216,000 |
| Kaweah No. 2..... | 2,300 | 369 | 10,634,000 |
| Kaweah No. 3..... | 3,800 | 775 | 27,436,000 |
| Tule..... | 2,700 | 1130 | 18,499,000 |
| Santa Ana River No. 1..... | 4,000 | 760 | 27,331,000 |
| Santa Ana River No. 2..... | 1,300 | 310 | 10,441,000 |
| Santa Ana River No. 3..... | 2,000 | 352 | 12,875,000 |
| Mill Creek No. 1..... | 1,000 | 506 | 5,247,000 |
| Mill Creek Nos. 2 and 3..... | 4,300 | 627-1905 | 26,911,000 |
| Lytle Creek..... | 700 | 481 | 4,771,000 |
| Sierra..... | 800 | 625 | 5,586,000 |
| Azusa..... | 2,000 | 403 | 13,609,000 |
| Fontana..... | 2,400 | 770 | 16,161,000 |
| Total..... | 112,200 | | 625,410,000 |
| Total HydroElectric Plants..... | 371,000 | | 1,058,655,000 |
| STEAM PLANTS | | | |
| Long Beach..... | 63,000 | ..... | 68,681,000 |
| Redondo..... | 53,600 | ..... | 4,040,000 |
| Santa Barbara..... | 2,500 | ..... | ..... |
| Visalia..... | 7,700 | ..... | ..... |
| Total..... | 126,800 | | 72,721,000 |
| Total Production..... | 497,800 | | 1,131,376,000 |

NOTE: The Kilowatt-hours output from the Big Creek plants for 1922 did not contain any kilowatt-hours from the 3rd unit in B.C. No. 1 or from powerhouse B.C. No. 3, as these were not completed until 1923.

to an elevation slightly above 7,000 ft. at the Florence Lake reservoir site. Between this point and the tail water of Power House No. 4 the river drops more than 6,000 ft., an aggregate fall of more than a mile through which the falling waters of this mountain

SOUTHERN CALIFORNIA EDISON COMPANY HYDRO ELECTRIC DEVELOPMENT ON THE SAN JOAQUIN RIVER AND BIG CREEK



SUMMARY OF POWERHOUSES AND RESERVOIRS

| POWERHOUSES | HEAD | CAPACITY H.P. | |
|-----------------------------|------|---------------|------------------|
| | | YEAR 1923 | ULTIMATE |
| Nº 1 | 2131 | 64300 | 86000 |
| Nº 2 | 1858 | 64300 | 86000 |
| Nº 2-A | 2400 | - | 300000 |
| Nº 3 | 830 | 100000 | 200000 |
| Nº 4 | 340 | - | 67000 |
| Nº 5 & 6 | 1480 | - | 134000 |
| Nº 7 | 960 | - | 80000 |
| Nº 8 | 715 | 30200 | 134000 |
| Nº 9 to 15 Group Total | 3880 | - | 180000 |
| Nº 9-16-17 & 18 Group Total | 2190 | - | 133000 |
| TOTAL | | 258800 | 1,400,000 |

| RESERVOIRS | ELEVATION | CAPACITY ACRE FEET | |
|-----------------|-----------|--------------------|---------------|
| | | YEAR 1923 | ULTIMATE |
| HUNTINGTON LAKE | 6950 | 88000 | 88000 |
| SHAYER LAKE | 5400 | 6000 | 210000 |
| FLORENCE LAKE | 7305 | - | 42000 |
| BLANEY MEADOWS | 7700 | - | 23000 |
| VERMILION | 7625 | - | 90000 |
| MAMMOTH POOL | 3187 | - | 27000 |
| CHIKUITO | 5005 | - | 80000 |
| MADERA JACKASS | 7070 | - | 100000 |
| FORKS | 3900 | - | 23000 |
| PARADISE BAR | 4530 | - | 22000 |
| MILLERS BRIDGE | 4780 | - | 25000 |
| JUNCTION BUTTE | 4925 | - | 4000 |
| TOTAL | | 94000 | 734000 |

Map of the drainage area of Big Creek and the San Joaquin River showing where the plants which will generate 1,400,000 hp. will be located.

stream can be used for the generation of electric power. Big Creek, one of the principal tributaries, rises above Huntington Lake and falls a total of 4,720 ft. between the lake and its junction with the main river at the tail water of Power House No. 8.

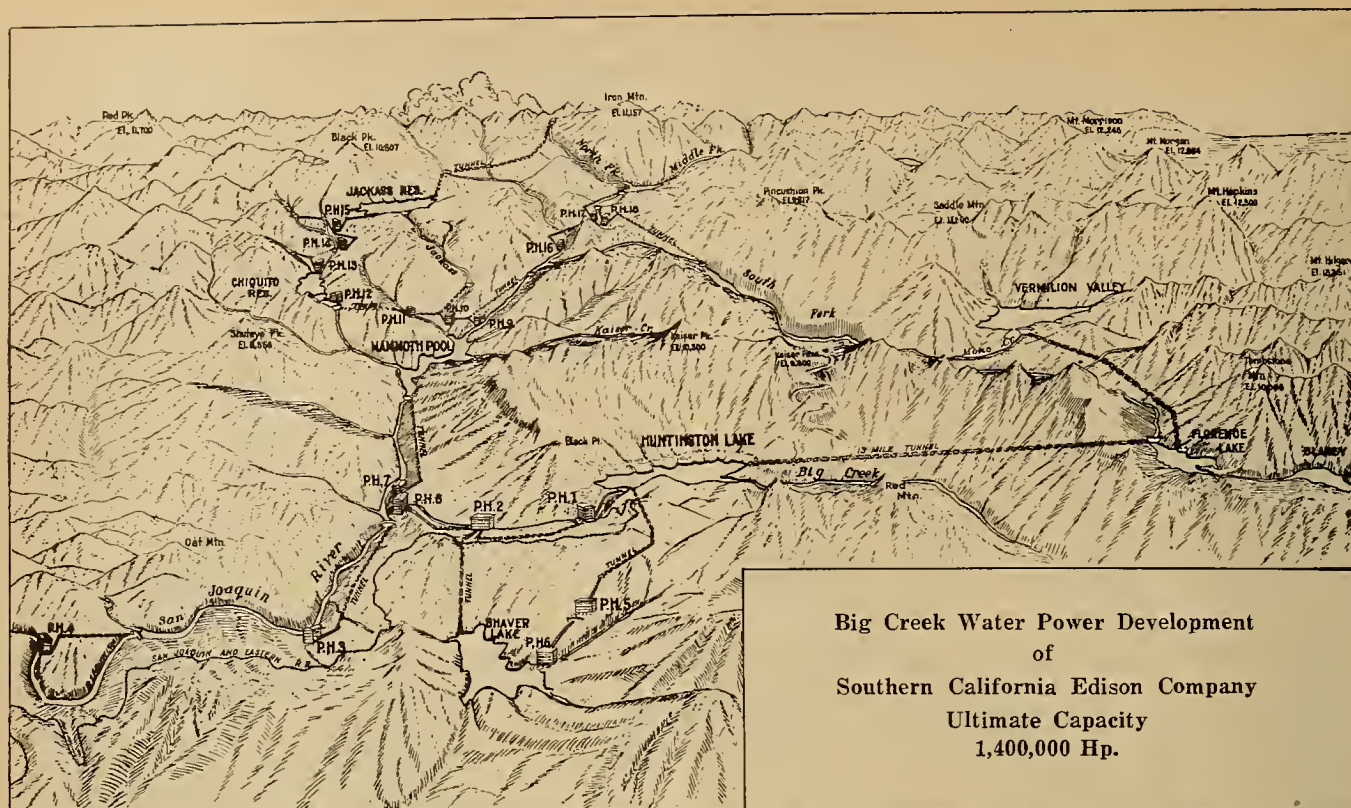
The general scheme for developing this great source of hydroelectric power consists of the construction of a chain of power houses in series between Huntington Lake and Plant No. 4. This chain of power houses in the order of their location, beginning at Huntington Lake, will consist of Nos. 1, 2, 8, 3 and 4. Water from Huntington Lake will also be conducted to a second reservoir to be constructed, known as Shaver Lake, with a capacity of 210,000 acre-feet. This water, in its passage between the two reservoirs will go through Power Houses Nos. 5 and 6. From Shaver Lake the water will then pass through Plants Nos. 2-A, 8, 3 and 4. Plant No. 2-A, with an ultimate capacity of 300,000 hp. and a head of 2,400 ft., will be the largest on the project and will have the highest head of any plant in the United States.

In addition to these, preliminary plans have been adopted for the development of a series of plants on the Middle Fork of the San Joaquin River, Jackass Creek and Chiquito Creek. Of this series, Power House No. 7 will have an ultimate capacity of

80,000 hp. under a head of 820 ft. Plants Nos. 9-15 will be capable of developing 180,000 hp. under a total head for the entire group of 3,750 ft., while plants Nos. 9, 16, 17, 18 will be capable of turning out 140,000 hp. under a total head for the group of 2,150 ft. All data regarding these plants, which are known as the West Side Development, are approximate and future demands for power may change these plans materially.

The principal hydraulic features of the project are shown in schematic form in the accompanying artist's conception of the drainage area showing the tunnel lines, pressure pipe lines, reservoirs and power plants.

Huntington Lake is now supplied exclusively from Big Creek. In order to increase the water supply to the plants below this reservoir, the development program includes the construction of Florence Lake tunnel, 13.5 miles in length, with a capacity of 1,000 sec.-ft., which will tap the South Fork of the San Joaquin at Florence Lake. This tunnel, which is being built through solid granite, will be completed by April, 1926. Through it the waters of the South Fork of the San Joaquin, together with Mono and Bear Creeks, will be diverted into Huntington Lake. Later on a tunnel will be built to Shaver Lake in which will be stored such



Bird's-eye view of the Big Creek-San Joaquin River drainage area showing the relative locations of the various reservoirs, tunnels and power plants.

excess waters above the capacity of Huntington Lake as are delivered through the Florence Lake Tunnel. Complete utilization of all the waters made available through Florence Lake Tunnel will produce, through the chain of power houses below Huntington Lake, 1,750,000,000 kw-hr., representing a value in the power market of over \$30,000,000 annually.

**Table VII—Summary of Tunnel Lines
Big Creek-San Joaquin Development**

| Description | Section Sq. Ft. | Capacity Sec. Ft. | Approx. Length Miles |
|---|--------------------|----------------------|----------------------------|
| Mono and Bear Creek to Florence Tunnel..... | 120 | 600 | 6.4 |
| Florence Lake to Huntington Lake..... | 200 | 1,000 | 13.0 |
| Huntington Lake to P. H. No. 1..... | 112 | 800 | .7 |
| P. H. 1 to P. H. 2..... | 112 | 700 | 4.0 |
| P. H. 2 to P. H. 8..... | 340 | 2,050 | 1.1 |
| P. H. 8 to P. H. 3..... | 415 | 3,000 | 4.7 |
| P. H. 3 to P. H. 4..... | 415 | 3,000 | 3.0 |
| Huntington Lake to P. H. 5..... | 200 | 1,100 | 6.0 |
| P. H. 5 to P. H. 6..... | 200 | 1,100 | 2.5 |
| Shaver Lake to P. H. 2-A..... | 300 | 1,500 | 2.6 |

WEST SIDE DEVELOPMENT

(Information not complete—data approximate.)

| | | | |
|--|-----|-------|-----|
| Iron Fork to Madera Jackass Reservoir..... | 80 | 400 | 9.5 |
| Madera Jackass to P. H. No. 5..... | 70 | 350 | 2.5 |
| P. H. 15 to P. H. 14..... | 80 | 400 | .2 |
| P. H. 14 to P. H. 13..... | 80 | 400 | 1.0 |
| P. H. 12 to P. H. 11..... | 130 | 650 | 2.4 |
| P. H. 11 to P. H. 10..... | 130 | 650 | 1.1 |
| P. H. 10 to P. H. 9..... | 130 | 650 | .7 |
| Junction Butte Reservoir to P. H. 17..... | 100 | 500 | 2.2 |
| Paradise Bar Reservoir to P. H. 16..... | 160 | 800 | 2.7 |
| Hoffman Creek to P. H. 18..... | 50 | 250 | 4.6 |
| Forks Reservoir to P. H. 9..... | 170 | 850 | 4.7 |
| Mammoth Pool to P. H. 7..... | 250 | 1,250 | 8.0 |

Total..... 83.6

The completed development will include approximately 83.6 miles of tunnels of which the Florence Lake tunnel is the longest. Data on the tunnels,

practically all of which are to be driven through solid granite, are shown in Table VII.

The 1923 program, which is under way at the present time, involves the expenditure of \$26,000,000 as follows:

| | |
|--|--------------|
| Water Power Development..... | \$11,851,000 |
| 220,000-Volt Transmission Lines and Substations | 4,149,000 |
| Steam and Miscellaneous Water Power Plants | 265,000 |
| Transmission Lines and Substations— (60,000 volts and under)..... | 1,535,000 |
| Distribution Lines and Substations..... | 6,800,000 |
| Miscellaneous | 1,400,000 |

The item, water power development, includes the completion of Big Creek No. 3, consisting of three units of 33,000 hp. each, the first of which will be put into operation in August, 1923, to be followed by the remaining units in September and October. Also a third unit of 21,400 hp. will be installed in Power House No. 1 and will be ready for operation in July, 1923. In addition to these power houses, active work will be continued on the Florence Lake tunnel which is 20 per cent complete at the present time.

Work on the 220,000-volt transmission lines and substations includes changing over the present 150,000-volt Big Creek lines to 220,000 volts and the installation of two banks of 220,000/150,000-volt auto-transformers at Big Creek No. 1, Big Creek No. 2 and Vestal Substation. Each bank will have a capacity output of 52,500 kva., equivalent to the full station capacity of either of the two plants. There will

also be installed at Eagle Rock substation two banks of 200,000/150,000-volt auto-transformers, each bank having a capacity output of 110,000 kva. Before the end of the present year there will have been completed the new 220,000-volt Laguna Bell Substation, with an initial capacity of 120,000 kva. and a 30-mile 220,000-volt transmission line connecting the new substation to the present Eagle Rock station.

The reason for increasing the transmission line voltage to 220,000 volts is purely one of cost. The present lines at 150,000 volts are fully loaded and with the increase in generating capacity due to the completion of the present plants under construction, new lines would be necessary to bring this power to the load center. The capacity can be doubled either by building two new lines at 150,000 volts at a cost of \$12,000,000 to \$15,000,000, or by increasing the voltage of the present lines to 220,000 volts at a cost of approximately \$3,000,000. The elimination of not less than \$9,000,000 from the construction cost results in a saving of \$720,000 a year which is passed on to the consumer in the form of decreased rates.

Pioneering in High Tension Transmission

The Southern California Edison Company has consistently pioneered in high tension transmission, having been the first company to operate lines at 30, 60 and 150 kv. With the commercial operation of the Big Creek lines at the record breaking potential of 220,000 volts by May 1, 1923, it will have again set a world's record for the economic transmission of electrical energy at high voltages from generating plant to load center.

The Edison construction army, which is engaged in the development program, is working over a line of 30 miles, extending from Florence Lake far over the Kaiser ridge in the high Sierra to the site of Power House No. 3, near the bottom of the San Joaquin gorge. The problem of transporting supplies and materials to five thousand men has been one of the engineering difficulties to be overcome. Roads have been blasted from solid granite cliffs. Telephone lines have been built for communication purposes and radio stations installed so that those supervising the work may be in constant touch with each field unit, even during the winter months when half of the camps are completely isolated from the rest of the world by deep snows. Mail is carried into these camps in the winter months by a team of Alaska huskies over snow 16 ft. deep.

Then there is the human side—the task of providing amusements, proper quarters, and medical attention for the workers. There are recreation centers and hospitals even in the farthestmost camp. The men know they are working on one of the greatest construction jobs ever undertaken in this country, and in consequence have established construction records never before achieved.

Customer-Ownership

There is one last question in connection with an undertaking of such magnitude as this. Where is the \$300,000,000 necessary for its building to be secured? The answer is simple: from the people who are to

derive the ultimate benefits from the power which is to be generated—the ultimate consumers. Following out a policy of customer-ownership, the Southern California Edison Company is seeking to make each one of its many consumers a partner in the business. That this plan has been successful is shown in Table VIII, which indicates the growth in the number of consumer-owners since this campaign was under-

Table VIII—Growth in Number of Stockholders

| | Number of Stockholders |
|--------------------|---------------------------|
| July 1, 1917..... | 1,864 |
| Dec. 31, 1917..... | 4,213 |
| Dec. 31, 1918..... | 3,940 |
| Dec. 31, 1919..... | 7,016 |
| Dec. 31, 1920..... | 7,197 |
| July 1, 1921..... | 16,984 |
| May 15, 1922..... | 36,700 |
| Dec. 31, 1922..... | 48,108 |

taken in 1917. On Jan. 1, 1923, the number of stockholders was 48,108, ninety-eight per cent of whom reside in California and seventy per cent of whom were supplied by the Southern California Edison service. New customer-owners are being secured at the rate of 2,000 a month.

The Colorado River

California is still in its infancy. The future holds forth greater promise for development and expansion than has been accomplished in the past. This growth will be dependent to a large extent upon the power supply. It is estimated that the need for power in California will exhaust the hydroelectric resources of the state within fifteen years. However, the Colorado River below Lee's Ferry, exclusive of the Grand Canyon, offers possibilities for the development of 3,500,000 hp. of electrical energy, a prorated part of which will be available for use in southern California.

Within the next few years the demand for the regulation of the Colorado River to overcome the present flood hazards and the need for power in Arizona and the entire Colorado River Basin, will be such that the development of this stream will be vitally necessary. Its development will serve not only to meet the present power requirements in the Colorado River Basin, but will also stimulate general community activities throughout the entire Southwest, including California, with the result that additional power markets will be created.

The Southern California Edison Company stands ready to construct the necessary works on the Colorado River under Federal regulation in a manner that will secure relief from flood danger and provide power for the entire territory. Its ability to carry out this great work is demonstrated by its successful execution of the Big Creek-San Joaquin River project, a task of equal magnitude. In undertaking the development of the Colorado, the company would proceed in the same way that it has in the past, taking in as partners all of the people of the Colorado River Basin. Such a system of development would work the highest justice in economic service to the consuming public, the employees and the investor.

An Interview with General J. G. Harbord

President Radio Corporation of America

By Norman S. Gallison

RADIO today possesses the potentialities that the automobile industry did twenty years ago. Every home offers possibilities for the installation of some form of radio set. Opportunity so far as the electrical industry is concerned, is at hand. Because General Harbord heads the largest radio concern in the world, it was thought that any remarks he might make on the subject of radio would prove of more than passing interest to the members of the electrical industry here in the West. It was with this in mind that the following interview was obtained.

For those who do not know, General Harbord was one of the outstanding American officers in the World War. As chief of staff for General Pershing, he played an important part in the organization of the American Expeditionary Forces. He commanded the Marine Brigade of the Second Division in the Verdun sector during the fighting at Belleau Wood and Bouresches near Chateau Thierry, which stopped the German advance on Paris in June, 1918. He commanded the Second Division during the Soissons offensive. Later as commander of the Service of Supply, he was faced with the task of keeping the A.E.F. supplied with food, clothing and munitions. He resigned from the regular army on Dec. 29, 1922, and became president of the Radio Corporation of America Jan. 1, 1923.

The interview follows:

General Harbord, we understand that you have been in the army all your life. Are you a West Point graduate? When you were graduated from West Point, what branch of the service did you join?

I am not a graduate of West Point. I entered the Army when I was 22 years of age. After completing the course at the Agricultural College of Kansas and teaching school a year, I enlisted as a private with the idea of getting a commission. I served in the ranks two and one-half years and got the commission, which was that of Second Lieutenant, Fifth Cavalry.

During the course of your army career were you especially interested in communication work, which, I understand, is ordinarily the function of the Signal Corps? Obviously, the matter of communications between the front and the various supply depots must have given you a vivid presentation of the value of radio during the World War?

The Signal Corps has charge of the electric communications of the army. I was not especially concerned in the work of the Signal Corps. I spent some 12 years in the Philippines, where I was one of the heads of the Philippine Constabulary. I had a good deal to do with matters that gave me an opportunity to see how important these communications were. During the war, when I was in command of the Service of Supply, I was very much impressed with the importance of communication

systems—that they were the nerve system of the whole military organization. The Signal Corps in France under the Service of Supply, of which I had command, had at the close of the war a network of constructed and leased lines in France of over 34,000 miles and they had themselves strung over 100,000 miles of wire. At the close of the war we had a communication system handling 45,000 messages daily, of an average of 60 words per message. The



James G. Harbord, president, Radio Corporation of America

credit for that is due to General Russell, Signal Officer, A.E.F. It was only one phase of my business.

Now we understand you have become president of the Radio Corporation of America. Have you progressed far enough along in this connection to express an opinion as to the lines along which the commercial development of radio will extend?

My opinion on that would be that of any ordinarily intelligent man who is more or less familiar with the situation, namely—the organization of the Radio Corporation was originally for the purpose principally of trans-oceanic and international communication by wireless. The development of the radio art and the organization of the Radio Corporation brought to us in the radio field the possession of a number of patents, which with the whole development of broadcasting, made it a perfectly natural thing for the Radio Corporation to assume that function which is equal in importance to its original purpose of communication. Thus the indicated development of the Radio Corporation is along the line of international communication and the development of radio broadcasting in this country. The catering

to its immediate needs naturally leads to the manufacture and sale of apparatus and parts.

As we understand it, the development of radio commercially is a field distinct from the broadcasting activities. Do you believe that radio broadcasting will eventually largely supplement, if not in part displace, present methods for the disseminating of news, market reports, weather reports and entertainment?

I think that it will supplement them. I don't believe that the time will ever come when it will replace newspapers and agencies of that sort. Broadcasting of market reports and such information falls on the ears of a million people but no one makes a record of it and it is out and gone. You pick up your daily newspaper, read it this morning and because you note something of more than passing interest, you lay the paper away on a shelf where it will remain for a year or more, a matter of history. I do not think broadcasting will ever replace the printed page where any of the more permanent appeals to the people are concerned, but I do think it is the most powerful humanizing agency in the world. The daily papers may put over some particular piece of information but they do not reach everyone at the same date or same time. We can reach many millions of people through radio broadcasting simultaneously. To read a newspaper and to subscribe to a daily newspaper means a certain amount of education on the part of the person who reads it and financial ability to subscribe to daily papers. But by broadcasting, these people have a means of getting the benefit of news or information of any kind without even knowing how to read. To groups of people of that sort, one broadcasting set with proper amplifiers will reach great numbers at the same time. Broadcasting may supplement, but it will never replace the printed page. People, throughout the ages, have had a tendency to believe that important new inventions were going to disrupt the social and economic scheme by putting many people out of employment. They have always resulted in more work for everybody—the cotton spinner, the locomotive and various forms of mechanical devices have not produced lack of employment.

In your opinion, do you believe that the recommendations of Secretary Hoover for the imposition of federal regulations governing the transmission of radio messages is practical and can be made effective?

I believe regulation is essential. The situation now is that the law has not been changed since 1912. A very large number of wave lengths were reserved for government purposes in this country, leaving only a fraction of the wave lengths for use for commercial purposes. Changes in the law are badly needed. There is an appeal for everybody's interest in broadcasting. We are very strong in the belief that it should be properly regulated by the federal government.

Do you think that because a man owns a 50-foot lot he owns all of the air above?

I do not think there is very much in that. We do not allow a man on his 50 ft. of ground to main-

tain a nuisance in any form or keep it unsanitary or unhygienic. Why, then, should you allow him to pollute the air above him? The air lanes belong to all of the people.

Do you believe in the development of radio that industrial history will in any way repeat itself, and that ultimately the same situation will obtain as now exists in the steel industry where a few large corporations control the market, or will there always be a field for the small individual manufacturer?

I think that there will always be a field for the small individual manufacturer. There are hundreds and thousands of manufacturers here now and more and more of these small manufacturers will come into the field as the art develops. The radio industry will tend to simulate the automobile industry rather than the steel industry. I think that things will soon be standardized and that in a very few years you will see manufacturers of radio wherever they are justified, just as it is now in the manufacture of lamps and other electrical devices.

What do you think of the future of radio insofar as it affects the future of the electrical distributor and the electrical dealer? Are these groups taking the fullest advantage of the present opportunity afforded by radio?

I do not think that they are taking the fullest advantage of their opportunity. The demand for electrical apparatus in this country has been such that they have largely become necessities. In their particular fields, it is the part of the electrical dealers to sell what they have. Someone wants a particular kind of apparatus or a certain lamp. The dealer doesn't have to run after him to sell him that. He goes into the store and buys it. My observations of electrical concerns are not particularly close or broad, but I do not think they are especially well organized as yet for merchandising radio equipment. As Mr. Sarnoff stated in his talk the other day, we feel that the potential customer for radio business of the future is very apt to be a lady. Radio devices are becoming more and more decorative and it takes a woman's taste to see that they match the rest of the furniture. When you have a lady customer you have to provide the little accessories that appeal to her and attract her. I do not think the electrical concerns have waked up to this fact. They do not show as much initiative along that line as the music dealers, for instance, or the big department stores. The field is there.

Do you believe that the prediction made in Bellamy's "Looking Backward" may in time justify the author's prophetic vision in which, as you will remember, in every household, market reports, music, the drama, news and the sermon were instantly available during certain hours of the day at the will of the citizen?

It's over 20 years since I read that book. As you sum up his prophecy, I feel that it is almost here now. Such facilities are available if we want to take advantage of them. Putting a radio set into the home means getting the money to pay for it and selecting a good set, that's all. Opportunity is knocking at the door this moment. It is here today.

Thank you, General Harbord.

ELECTRICITY IN INDUSTRY



By Louis F. Leurey
Industrial Electrical Engineer

Automatic Control for Compressor Made from Stock Street Car Parts

THE Market Street Railway of San Francisco has operated for a number of years a large quarry from which it has secured much material for track ballast. About six years ago John T. Gaylord, foreman for the railway company, devised a very practicable and comparatively inexpensive plan for controlling this air compressor automatically so as to take care of the demands upon the air reservoir tank.

Compressed air drills at the quarry were supplied with air from the reservoir of the compressor and except for conditions of starting and stopping no attendance was needed at this point. From the point of view of efficiency it was necessary that the air pressure be kept between the maximum and minimum limits of 100 and 85 lb. respectively.

Mr. Gaylord undertook to save the cost of attendance at the compressor by rigging up an

automatic control starting and stopping device on the compressor motor. As the company operates a street railway system, all parts used in this device are stock equipment used in other departments of street railway work which was naturally a considerable advantage from the point of view of maintenance and replacement.

The accompanying drawing shows in detail all of the elements of the plan which, briefly, consists of using a standard governor such as is used in connection with street car compressor motors. The governor in turn admits air to a cylinder and piston which by means of valves, normally used in compressed air whistle lines, operates with graduated movement, a contact brush which slides over the contact plates and these plates in turn cut in and out sections of resistance to the motor.

Provision is also made by means of a double throw bypass switch and a series of snap switches for contactor control so that when there is no pres-

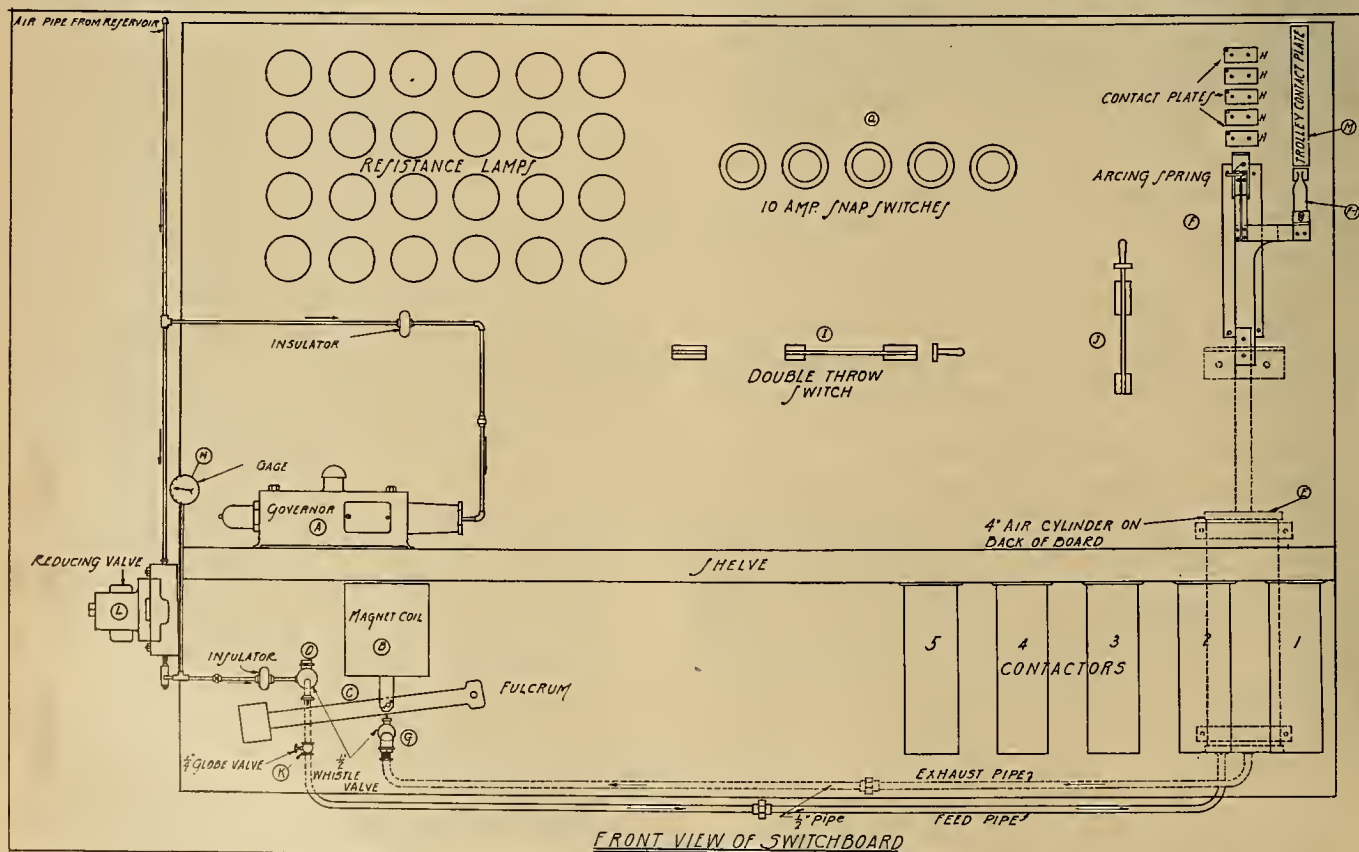


Diagram of the switchboard installed at the marble quarry of the Market Street Railway Company of San Francisco. The equipment on this board was all secured from the stock parts used on street cars of the company.

sure in the tank the motor can be manually started at the beginning of the day's work.

It is quite possible that if the railway company were to make this installation today it would have no trouble in finding standard equipment which would save it from the development of special equipment of this type, but it illustrates in a notable manner that the remarkable development in controlling devices during the past four or five years has been in response to an insistent demand on the part of the electrical users for the elimination of all unnecessary manual operations in electrical control.

Central Station Service for the Miner

JUST as electricity has entered the modern city and driven other forms of power and light from the field, so it is serving the mining camps in the vicinity of Randsburg, Calif., providing them with an inexpensive and efficient motive and illuminating force. Hand power, water power and steam power have given way to the more easily controlled and more effective electrical drive.

As evidence of the fact that not all of the discoveries of deposits of precious metals were made in



Head frame of the California Rand Mine, one of the properties in the Randsburg district that is operated by electricity.

the "Days of '49," is the Kelly mine which was located in 1918. This is a silver bearing property which was "staked out" by three prospectors, and has since proved to be so rich in minerals that the prospectors were able to ship high grade ore after sinking a shaft only a few feet.

This mine is of particular interest to the electrical industry when it is known that in 1919 the ore was hauled from the shaft by means of a one-man-power hoist and at the present time 1,000 hp. of electrical equipment has been installed on the property. This mine has been supplied with power by the Southern Sierras Power Company, of Riverside, Calif., and it is partly due to the interest of the power company in aiding the engineers of the company that the modern installation has been made.

The success with which electricity has been employed in operating the larger mining properties in the Randsburg district has led the smaller operators to install electrical equipment in their properties also. A typical installation sufficient to develop a depth of 500 ft. consists of a 50-hp. slip-ring motor

on single drum hoist, a 75-lb. squirrel cage motor on compressor, and a 10-hp. squirrel cage motor on the blower. In addition a lighting load of 2 kw. is usually necessary. The standard service is 440 volts and due to small area it has been found expedient to distribute from one 33-kv. substation to the various properties. The diversity factor is high and it is observed that these properties during development will show a 60 per cent demand and 50 per cent load factor. With the installation of a 100-ton mill the connected load increases approximately 300 hp. and due to continuous operation, the above conditions are materially improved and the mining companies decrease their unit power costs.

Automatic Control for Small Currents

INDUSTRIAL establishments are rapidly learning the great operating advantages of automatic electrical control not only for the heavier operations but for the numerous minor operations throughout the industrial plants, all of which form an important part in producing the manufactured product.

One of the most recent devices introduced on the Pacific Coast to assist in automatic control of cur-



Motor operated switch designed for automatically controlling currents for equipment drawing comparatively low amperage.

rents up to 20 amp. 220-volt or 30 amp. 110 volts, is shown in the accompanying illustration.

This device consists of a motor driven snap switch enclosed in an iron clad case and is of extremely simple but very rugged construction. It very readily adapts itself in connection with thermostats to control small industrial heaters, glue pots and the various types of industrial baths that must be maintained at constant temperature and whose usage of current is within its range of capacity.

JOBBER, DEALER AND SALES AGENT



How Many Electrical Men are Electrical Users

California Electrical Cooperative Campaign Figures Show that Members of Industry Have Many Appliances

In order to determine the number of men in the electrical industry in San Francisco and Los Angeles who really believed in the electrical idea to the extent that they would install appliances and electrical equipment in their own homes, the California Electrical Cooperative Campaign recently conducted a survey among the members of the San Francisco Electrical Development League and the Los Angeles Electric Club. A total of 395 answers were received from the associations and from these returns an average per thousand homes was secured.

One hundred and forty-nine members of the San Francisco Electrical Development League reported that they had a total of 928 appliances in their homes, while 246 Los Angeles electrical men stated that they had in their homes 1,792 electrical appliances which were being used to lessen the work of their wives. The complete tabulation as to the various appliances in use by the wives of the electrical men is shown in the accompanying table.

In addition to securing the actual totals, the numbers of appliances in use

were figured to show the average number in use per thousand homes in the two cities. These figures show the average based upon the results obtained from the electrical men's replies.

This average number of appliances per thousand homes shows how the various appliances are regarded by electrical men of the two cities and in addition a comparison is made with national figures, for all residence users of electricity. These data were secured from a survey, the results of which were printed in the September, 1922, issue of "Electrical Merchandising."

In comparing these three sets of average figures it can be seen that in both of the California cities electrical men have more appliances per thousand homes than are present in the average thousand homes throughout the nation, with only one exception. The California electrical men have fewer electric fans per thousand homes than have the other residents of the nation. This is undoubtedly due to the fact that the summer weather in the two cities is not as intense as it is in other cities of the country. As regards every other

appliance, the electrical men of the two cities have shown that they appreciate the value of appliances more than do the average group in the United States.

While the statistics on the number of appliances were being secured the electrical men were also asked to report the number of convenience outlets in their homes. Replies on this showed that in the 149 homes from which answers were received in San Francisco, there are a total of 689 convenience outlets or an average of 4.6 per home and the Los Angeles men reported that in 102 homes there are 625 convenience outlets or an average of slightly over 6 per home. No national figures are available to compare with these totals.

The results of the questionnaires sent to these electrical men show that the men are themselves sold on the electrical appliances that they are behind and that the work among the members of the industry to encourage them to use electrical equipment has borne fruit. Statistics showing the public that the electrical industry is behind the electrical idea and is itself using the appliances that are offered to the public are of great value in convincing the possible purchaser that electrical devices are adapted to his needs.

| APPLIANCES | APPLIANCES ACTUALLY IN USE | | AVERAGE PER M. HOMES | | *NATIONAL |
|------------------------|----------------------------|-------------------|----------------------|-------------|-----------|
| | San Francisco (149) | Los Angeles (246) | San Francisco | Los Angeles | |
| Irons..... | 163 | 308 | 1,094 | 1,250 | 720 |
| Toasters..... | 111 | 182 | 745 | 740 | 112 |
| Air Heaters..... | 110 | 81 | 738 | 329 | 130 |
| Percolators..... | 101 | 198 | 677 | 804 | 53 |
| Vacuum Cleaners..... | 78 | 175 | 523 | 711 | 360 |
| Washing Machines..... | 51 | 98 | 342 | 398 | 295 |
| Waffle Irons..... | 43 | 69 | 288 | 280 | |
| Curling Irons..... | 35 | 111 | 235 | 451 | |
| Grills..... | 33 | 74 | 221 | 301 | |
| Ranges..... | 29 | 18 | 194 | 73 | 16 |
| Sewing Machines..... | 26 | 106 | 174 | 431 | 48 |
| Warming Pads..... | 26 | 139 | 174 | 565 | |
| Water Heaters..... | 21 | 15 | 141 | 61 | |
| Chafing Dishes..... | 16 | 25 | 107 | 102 | |
| Disk Stoves..... | 11 | 0 | 74 | 0 | |
| Fans..... | 10 | 86 | 67 | 350 | 360 |
| Ironing Machines..... | 7 | 13 | 47 | 53 | 12 |
| Samovars..... | 7 | 0 | 47 | 0 | |
| Vibrators..... | 6 | 55 | 40 | 224 | |
| Violet Ray..... | 5 | 0 | 34 | 0 | |
| Utility Motors..... | 5 | 10 | 34 | 41 | |
| Mixing Machines..... | 4 | 7 | 27 | 28 | |
| Immersion Heaters..... | 4 | 0 | 27 | 0 | |
| Dish Washers..... | 4 | 3 | 27 | 12 | 11 |
| Radio..... | 3 | 0 | 20 | 0 | |
| Cookers..... | 3 | 0 | 20 | 0 | |
| Milk Warmers..... | 3 | 9 | 20 | 37 | |
| Soldering Irons..... | 2 | 0 | 13 | 0 | |
| Hair Dryers..... | 8 | 8 | 13 | 33 | |
| Miscellaneous..... | 9 | 2 | 60 | 8 | |
| | 928 | 1,792 | 6,223 | 7,282 | |

*See Electrical Merchandising, Sept., 1922.

Locating the Electrical Contractor-Dealer's Store

A Southern California Dealer Found that People Who Were Two Blocks from His Store Had Never Heard of It

Seven days a week the neighborhood store of a southern California electrical contractor-dealer was exposed to the eyes of the passer-by and six days a week the firm did a prosperous business. The owner of the establishment considered that he was making a good return on his investment.

However, the owner happened into a barber shop two blocks from his store one day and while there asked the barber why he did not liven-up his shop with more electric lights. The barber answered that he did not know where

in the vicinity that it serves, some definite advertising scheme must be followed to place the location of the store in the minds of possible customers. The electric sign used by this dealer proved to be one of his best advertising devices, for it notified the people of the neighborhood, where electrical goods could be purchased.

This same contractor-dealer, after discovering that a store could be well established and yet comparatively unknown, determined also that it was to his interest to talk electrical appliances



The Downer Electric Company of Santa Barbara, Calif., believes in the policy of advertising the location of its store to the extent that it spent in the neighborhood of \$300 in placing an electric sign in front of the establishment. This is not the store referred to in the accompanying article.

any electrical store near him was located. The electrical man was surprised at the barber's answer and decided to "check-up" on the standing of his establishment.

A number of inquiries were made throughout the neighborhood the store catered to, and the result of this casual survey astonished the owner of the electrical store. A great number of the people questioned, and a great many of them were business men, did not know where the nearest electrical store was located despite the fact that in many cases they were within two blocks of it.

As a result of this, the owner of the electric store ordered an electric sign which he hung in front of the establishment. The sign cost \$125 and according to the owner's report, net profits in the first thirty days that it was in position, paid for the cost of the sign.

This southern California man discovered that to make any store well-known

and electricity in general whenever he had the opportunity. It is his policy now, whenever he has the opportunity, to turn the conversation to the consideration of electricity and then to tie his store in with the electrical idea. In this way he advances the electrical industry and makes his store better known.

The advice of this contractor-dealer to the rest of the trade is that if a manager of an electrical firm wishes to increase the amount of business that it is doing, he should endeavor to determine how well his store is really known in the neighborhood that it serves.

Getting the place of business before the public is the duty of the electrical contractor-dealer and this duty can not be shifted. To get customers into the store, the manager must first make sure that it is well known. Electric signs have been found to be one of the most important aids to the merchant in establishing his store.

MERCHANDISING — YES JOB BUYING — NO

By JOE OSIER

"When the boys who maintain expensive shops and offices and who keep the clerks, stenographers, wiremen and other employees out of the ranks of the unemployed—

"Learn to merchandise electrical goods as well as their own and their help's efforts and—

"Forget the figuring and price cutting and job buying—

"The sooner will they be able to retire and take up golf—carpet and otherwise—in real earnest."

The above remarks were made to me just recently by a man in my town who knows the electrical game from consommé to cigarettes and—

When I say cigarettes I do not mean the kind donated by jobbers and manufacturers' representatives for banquets.

Between puffs from a cigar—made of tobacco—which must have set him back a "hick"—

He outlined to me the futility of Men of the Trade trying to outbid each other for—

The short end of a mean job.

"Instead of merchandising they are murdering," he said. "Murdering their business—their chances for a competence, in the sere and yellow leaf, and scalping some other hopeful in the game.

"Don't misunderstand me," he continued, chortling—"I am not putting all of the men engaged in the electrical industry in the grease. Mainly the ones I am aiming my barbs at are the witless ones who stay clear of associations and who try to—

"Outsmart the sharpshooters.

"Birds of that feather are the fowls that are making it tuff for the legits; they are the ones who are gumming up the parade and who will continue the process until they have been educated in the ways of the real, high class business man who is in the game for—

"Money and not misery."

And the answer, as he explained it to me, is this: Sign 'em up in the associations—local, state and national and—

When they are in the fold—show 'em the error of their ways.

Prove to them that a sharp pencil and a fine figure never got anyone anything except—

Checks marked N. S. F. and letters from the w.k. Mr. Dun. Convince them that every time they buy a contract, they are paging the Receiver, and that any job bought at the expense of overhead and self respect is not worth—

A whoop in the naughty word.

For, hear ye this, brothers, there is no royal road to riches except the one marked—

Legitimate business practice.

And, I repeat and will continue repeating as long as I have eight fingers, two thumbs and a typewriter that—

Until every Man of the Trade is in the corral and the associations are functioning as they should—

The Electrical Industry will not have attained the goal which it so justly deserves.

P.S.—The last lines are not funny. They constitute straight talk from a straight tongue.

I'll lead the cheering.

Making the Electrical Sticker Most Productive

Denver Gas & Electric Light Company Capitalizes on Appeal of Timeliness and Novelty of Color and Form

Spasmodic advertising of any nature, no matter what merits the advertisements may have, can never be considered as the most effective sort. To make an advertising campaign productive, a definite plan must be formulated and this must be backed by persistence and experience. Modern competition for the trade of the public has made it necessary for the progressive merchant to advertise his products in a systematic manner.

Sticker advertisements, that have been attached to different pieces of literature, have been in use for a number of years and in many cases have proved to be remarkably effective. In most cases, however, the use of these pieces of illustrated literature has been spasmodic and as a result many merchants have given up the work of advertising in this way.

As a user of sticker advertising, the Denver Gas & Electric Light Company can claim both persistence and experience over several years. Occasionally a month is skipped, but it is the practice of this company to attach stickers to the bills sent out monthly. A regular printing of a sticker is 50,000.

When advertising material of any sort is distributed in such quantities as this, abundant thought should be used in conception, and clever craftsmanship in execution, of the idea. A printing of 50,000 stickers may cost the company, art work and all, in the neighborhood of \$200. For postage, there is no additional expense as the monthly bills are going out anyway. Considering the cost of the advertising, and the great circulation obtained from it, the sticker merits all the cleverness that can be secured.

The sticker has certain outstanding favorable characteristics, simply because it is a sticker. First, it has color. Numerous experiments in the experimental laboratory have demonstrated the far greater attention-getting and interest value of the advertisement in colors compared with the advertisement without them. When the Denver Gas & Electric Light Company uses space in a Denver daily newspaper, color as an aid to advertising effectiveness is not available. When the same company advertises with a sticker, color is available as a basic condition.

The sticker has the appeal of the pictorial layout and will incorporate, if the advertiser so wishes, novelty of shape. Attached to a bill, the sticker is practically certain to "get before" the recipient, its pictorial treatment provides for this as the art work stands out strongly from the white billhead background. Starting with these advantages of the sticker, the advertising department of the Denver Gas & Electric Light Company follows certain principles which make stickers most effective. Samples of the stickers used may be seen on the opposite page.

Getting the Timely Appeal

When the model electric home was about to be opened to the public, the company got out a sticker, 6¾ in. x 4¼ in. The "message" consisted of a picture of the home, lighted up, at night,

which occupied all but a narrow margin used by a caption. The caption extended an invitation to the reader and his friend to visit the home. It told how to get there, and the hours when open.

A sticker which was put out shortly after the electric home exhibition used a picture based on the living room of the home. In the picture, a central ceiling fixture not present in the actual room was incorporated. This sticker was used to advertise fixtures and as the people of Denver had just seen the home the time element was right.

The stickers many people are familiar with are the kind that are printed today and used for months. They have no news, or timely, appeal. When the Denver Gas & Electric Light Company gets news and timeliness into stickers, it makes them different from most stickers, and also it gets all the favorable psychology of the news or timely element. These are used only when the stickers have a connection with some recent event, thus keeping them up-to-date.

At the time of an election, a company sticker portrayed a lady displaying a Hoover vacuum sweeper. At the top were the words, "Beats All Other Candidates." In addition to this tie-in with current events the sticker had news value because it announced, "SPECIAL TERMS NOW!"

Making Prices News

Most frequently, perhaps, stickers of this company get news interest from some reference to a special price or special campaign. Incidentally, this news is in the nature of "bargain" news, the predilection for this by the average woman buyer is well known.

At a time when the market in electrical goods was witnessing many downward price changes, the company got out an unillustrated sticker, which read as follows:

Manufacturers
Announce
**GREAT REDUCTION
IN PRICES**
on
Many Electrical
Appliances
A few of the most attractive
are as follows:

| | |
|--------------------------|------------------|
| Air-way sweepers | Kidphones |
| Flatirons | Grills |
| Percolators | Waffle irons |
| Toasters | Dishwashers |
| Electric sewing machines | Vibrators |
| Duplexalites | Chafing Dishes |
| Lighting Fixtures | Electric Heaters |
| Mazda Lamps | Table Lamps |

Buy Now at a Bargain

When the company had a new fixtures-for-old campaign on, a sticker used a whimsical sketch also used in newspaper advertising, and text which ran, "Hurray! Now we can have a new fixture. We can turn in that old one as part payment on a new fixture at the Denver Gas & Electric Light Company." One sticker was headed "For Three Weeks Only." It announced a "special reduction" on certain washing machines beginning at a stated date. Another sticker was headed, "Special Terms Now (The Month of March Only)."

When the element of timeliness can't be introduced in one way, it sometimes can be in another, using a literary trick. A sticker illustrating a fixture was headed, "Now's the time to re-fixture." The company used another device when a sticker was headed, "Hoover Time," with a giant figure "5" and the text, "Improvements Make the Hoover Electric Suction Sweeper More Desirable Than Ever."

Novelty and Variety of Form

This company's stickers adhere to no standard size or form, hardly any two being of exactly the same size. The customer gets no chance to become so accustomed to light company stickers that he doesn't look at them. Something new, always—a different size, or different color, or different pictorial treatment.

Most of the stickers are of liberal size. There was one, however, which went out to patrons in the business district, which was only 2¼ x 4¼ in. It was printed on blue paper and was headed, "Pull" in red. The inscription in black was, "PULL trade your way all the time with Electric Lights."

"PULL money—more money—by attractive lighting."

"PULL. We can pull any load with Electric Motors."

At the foot was the suggestion in small letters, "If you remit by mail, enclose bill."

Contrast with this a sticker of irregular shape which follows at the top, roughly, the contour of the back and head of a woman who is drudging away at a tub, or a large sticker of a housewife, the lower outline of which followed the lines of the woman's skirt and feet. In this case, the text was printed on the woman's white apron. Another one was shaped like a tub over which was a woman, almost submerged in suds, the caption of which read, "Don't sizzle in suds. Do a cool washing on a Thor electric washing machine. Special terms during July."

Most of the stickers are rectangular. Sometimes the bottom is a long side, sometimes a short side.

Catchy Sketches Add

The clever artist can help mightily the advertiser who uses stickers, not in one way only, but in several. A Denver artist prepared a drawing which had at the top a sketch of a red house against a blue sky. A yellow moon hung in the heavens and a giant yellow clothespin extended over the lower section of the sticker in such a way as to give the effect of the lower section being "washing" pinned to a line.

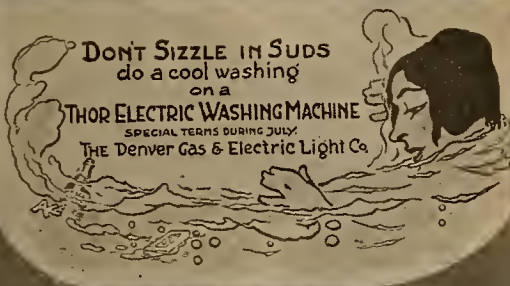
Cleverness of this type in sticker design does more than get a close tie-up between design and product advertised. No washing machine was pictured on this sticker, but the effect of the giant clothespin and the wash-on-the-line idea was just as good. In addition, there is the average normal reaction to such artistic cleverness.

The sticker is only one form of advertising. It is, however, important enough to get plenty of earnest and skillful attention. The Denver Gas & Electric Light Company has found that the time and effort used in developing its sticker campaign has been well spent and will continue to send stickers to its light and power customers.

The Sticker~The Silent Salesman



DENVER'S FIRST MODEL ELECTRICAL HOME. Just completed at 115 Clifton Street, is open every afternoon and evening for public inspection. You and your friends are invited to visit it today. Take 6th Avenue car, Route 6 or 7th Avenue Blvd., East, by automobile. Open daily from 2:00 P. M. to 10:00 P. M., STARTING MONDAY, MAY 28th.



DON'T SIZZLE IN SUDS
do a cool washing
on a
THOR ELECTRIC WASHING MACHINE
SPECIAL TERMS DURING JULY
The Denver Gas & Electric Light Co.

Pull

PULL trade your way all the time with Electric Lights.
PULL money—more money - by attractive lighting.
PULL We can pull any load with Electric Motors.

If you remit by mail, enclose bill.



For
3 weeks
only

SPECIAL REDUCTION
on **WESTERN ELECTRIC**
Washing
Machines

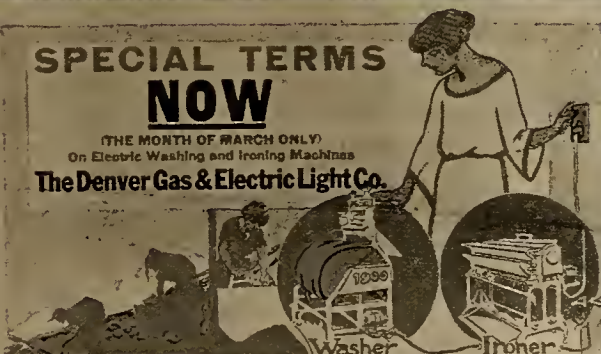
See
Display
in Our
Show
Room

COMMENCING
November 8

The Denver Gas & Electric Light Co.

SPECIAL TERMS NOW

(THE MONTH OF MARCH ONLY)
On Electric Washing and Ironing Machines
The Denver Gas & Electric Light Co.



Washer

Ironer



Come To Headquarters
for
Electric Lighting Fixtures
The Denver Gas & Electric Light Co.

HOOVER TIME



Improvements
Make
The
HOOVER
Electric Suction Sweeper
More
Desirable
Than Ever

THE DENVER GAS &
ELECTRIC LIGHT COMPANY



Why Rub Away
Your Life
and Your
Clothes

?

Save Both
With

**An Electric
Washing
Machine**

The Denver Gas and Electric
Light Company

Sacramento Dealer Distributes Thermometer to Customers

Merchandising publicity of one class or another is an essential factor in calling public attention to the contractor-dealer's store. While much of this material is often distributed to the dealer by the manufacturer for ultimate public consumption, occasionally an enterprising dealer will bring out material of



This effective piece of merchandising publicity was distributed to the housewives of Sacramento, Calif., by the Electrical Supply Company there.

his own. Calendars are one of the most common forms of material of this character, but there are others equally as effective.

The Electrical Supply Company, 814 J St., Sacramento, Calif., recently distributed among its customers a novel thermometer, which was the idea of C. V. Schneider, the store manager. As shown in the accompanying illustration, the thermometer was fashioned after a lamp. It measures 9½ in. from tip to base and 4½ in. across the widest part of the bulb. It was given to the housewife to be hung in the kitchen. It is printed in blue and black on white.

The thermometer is not exceedingly expensive and the idea is such an effective one that it can be adopted by any contractor-dealer who desires to bring out a new piece of merchandising publicity.

The Commonwealth Edison Electric Shops of Chicago publish in the advertisements of its Federal Washer a "Free Coupon for a Floor Pattern" which will show how the machine fits into the various spaces in apartment kitchens.

Order Blank for Switch Boxes Aid to Contractor

To simplify the work of the contractor in specifying the sizes and types for switch boxes and panel-cutouts, the American Metal Products Company of San Francisco, has perfected an order sheet which requires nothing but a few figures and check-marks on the part of the contractor to indicate the exact box that he desires.

While similar forms have been used by manufacturers, that designed by the American Metal Products Company incorporates all of the meritorious characteristics of any so far issued. As indicated in the accompanying illustration, it contains a plan of the metal blank before it is folded, a plan of the panel box itself and sketches of the various classes of doors that can be provided. With one of these orders specifying dimensions for a switch box is comparatively simple. Any explanations needed to supplement the dimensions and specifications provided for can

be written in under the heading "Remarks" or on the back of the order.

Contractors in localities where such forms are not provided by the metal shops can easily make up a similar order blank for their own use.

Instead of making a formal announcement of its removal, a Chicago concern retailing vacuum cleaners said it in this way: "The gently revolving brush and powerful suction of the Blank cleaner has picked us up and drawn us into a new and larger store at _____. Expanding business has made this move necessary."

The Salem Electric Company of Salem, Ore., a newspaper and a moving picture theater worked together to advertise radio and its equipment. While the theater was showing "The Radio King" the newspaper offered prizes for the best answers by children under thirteen to eighteen questions about radio and equipment. The electric company gave a crystal set as one of the prizes.

THE AMERICAN METAL PRODUCTS CO.

MANUFACTURERS OF
ELECTRIC SWITCH BOXES AND TRIMS
TELEPHONE KEARNY 2187 277 MINNA STREET SAN FRANCISCO, CAL.

ORDER

TOP

TOP WIDTH

HEIGHT

JOB

Panel-Cutouts
and
Switch Box

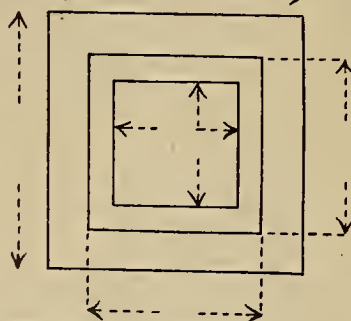
Mark hinges on sketch if door is wanted

| | |
|--------------|--|
| How Many? | |
| Gauge | |
| Black | |
| Galvanized | |
| Angle Edge | |
| Flanged " | |
| Raw " | |
| Lugs | |
| Panel Box | |
| Service " | |
| Pull " | |
| Cut Out " | |
| Meter " | |
| Conduits "O" | |
| Loom "X" | |

REMARKS

Symbols for Notes

| | | | | | | | | |
|----|---|---|---|----|----|---|----|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 1½ | ½ | ¾ | 1 | 1½ | 1½ | 2 | 2½ | 3 |



| | | |
|----------------------|-------------|--|
| FLUSH FINISH DOOR | Gauge | |
| | Trim | |
| | Solid Door | |
| | Glass "C" | |
| | " " "P" | |
| | " " "B. P." | |
| | Lock | |
| | Catch | |
| | Plain Door | |
| | Screw Cover | |

NAME

RECEIVED

ADDRESS

PROMISED

This simple form of order blank is provided by the manufacturer of switch boxes for contractors in order to simplify the task of specifying the size and type of box desired.

Large Electrical Installation in Seattle Apartment

Electricity in apartments as in other dwelling places is competing with other forms of fuel in the West, as is evidenced by reports from residents in the various states. To the electrical industry the growth of the electrical idea among apartment house and other large property owners is particularly pleasing for in one apartment house alone, a large amount of electrical equipment will be installed if the owner is sold on the electrical idea. Even when the equipment is installed, the market has not been closed, as the migrating tenants are always possible customers for appliances which can be used easily if the apartment is supplied with sufficient convenience outlets.

One of the most recently completed apartment dwellings in the western states, is the Spring Apartment-Hotel which has just been opened to tenants in Seattle, Wash. The apartment was built by W. A. Hainsworth, one of the city's most prominent citizens, and is the first hostelry of its kind erected in the Northwest and is said to be one of the finest structures devoted to hotel and apartment purposes on the Pacific Coast.

The structure, located on the northeast corner of Fifth Avenue and Spring Street, represents a total investment of \$750,000. It covers a ground area 60 x 120 ft., is eleven stories high and is of reinforced concrete construction. The first floor, exterior, is faced with red brick, the remaining ten floors with cream brick trimmed with terra cotta.

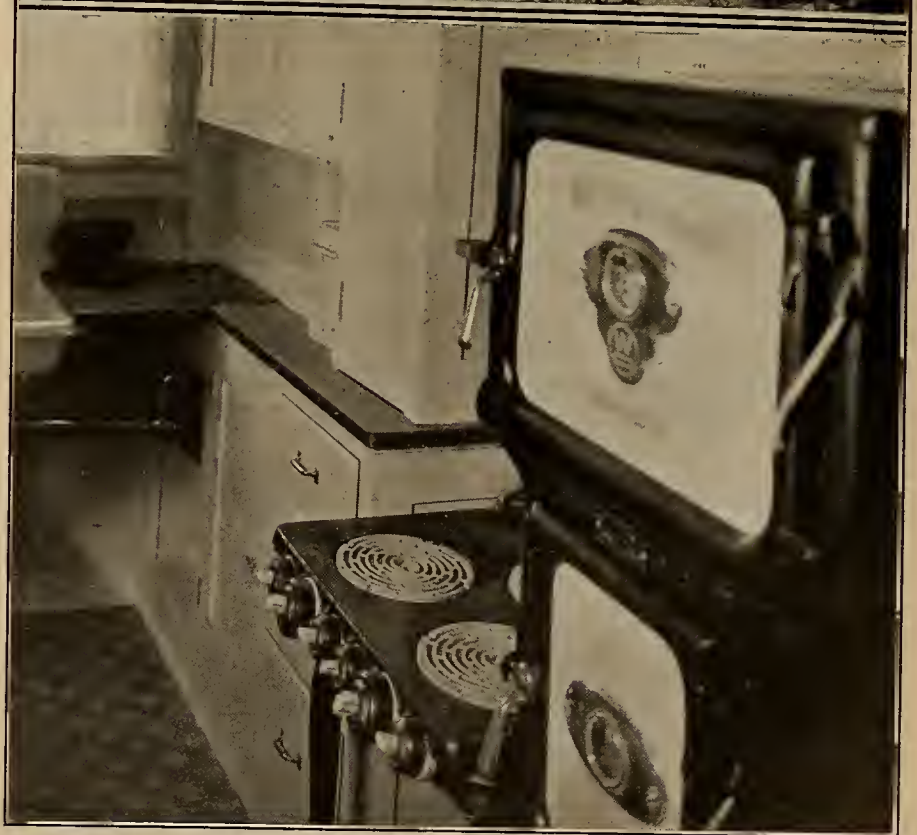
The building contains 117 apartments, 107 two-room and 10 three-room apartments. All told there are 244 rooms in the building. Each apartment is completely furnished and each of the 117 is equipped with a Westinghouse Electric & Manufacturing Company automatic range. This range installation is said to be the largest in the world and was handled by the Seattle Municipal Lighting Department, the utility that supplies current for the building. Each apartment is also furnished with a radio receiving set including a loud speaker. The building is wired for this purpose from a master receiver in the main office. This latter installation was furnished by the J. J. Agutter Company of Seattle.

The electrical wiring contract held by F. W. Rust & Company, Inc., Seattle, involved aside from the installation of an electric laundry and laundry driers, 150,000 ft. of copper wire; 50,000 lb. of conduit; 239 meters and other miscellaneous material and equipment.

The main line circuit breaker is 4,000-amp. capacity and was made especially for this building.

Each apartment has one iron outlet, one twin convenience outlet, to be used in the breakfast nook, one twin convenience outlet for the living room to be used for a vacuum cleaner or other appliance, and one twin outlet in the dressing room to be used for table lamps, curling irons, pads, fans, etc.

The structure was designed by John Graham, architect, Seattle, and erected by Hans Pederson, general contractor, also of Seattle.



(Above) Exterior of newly finished Spring Apartment-Hotel in Seattle, Wash., in which one hundred and seventeen automatic electric ranges were installed by the builder. There is a minimum of four convenience outlets in each apartment, many of these outlets being of the new duplex type. (Below) Electric ranges are installed in every one of the kitchens in the new apartment and in addition an iron outlet and a twin outlet are placed in the breakfast nook for use of appliances.

INDUSTRIAL NEWS



Changes in National Electrical Code Are Recommended

Following a public hearing conducted by the Electrical Committee of the National Fire Protection Association on March 12, at the rooms of the New York Board of Fire Underwriters, the committee held closed sessions on March 13 and 14 and determined to recommend to the National Fire Protection Association for adoption, proposed amendments to the National Electrical Code, a new edition of which is to be printed during the coming summer.

With a few important modifications the changes adopted are substantially those printed in the bulletin which was issued well in advance of the public hearing.

The proposal to require an approved weatherproof or rubber insulating covering for line wires operating at a voltage less than 500 was voted down. The proposal to require batteries between electric meters and gas meters was not adopted.

The proposed third paragraph of No. 15-A-j was modified to read as follows:

"Where the secondary system is grounded at the service, the equipment, conduit, armored cable, metal raceways and the like may, by special permission, be connected to the circuit grounding conductor, but otherwise shall have a separate grounding conductor of its own."

No. 15-A-n first paragraph is to be altered to conform to the above requirement; and the proposed new sentence in the 5th paragraph of No. 15-A-n is to be dropped.

The wrapping and soldering of wires to form a ground connection is not to be absolutely prohibited.

The proposed requirement of a deep outlet box on side walls has been changed to a recommendation.

The requirements for outdoor antennae have been modified in such a way as to require proper clearances and substantial construction but not to prohibit these wires from crossing over or under electric light or power wires, as was originally proposed.

Investigation Is to Be Made of Columbia River Project

Secretary Hubert Work, of the Interior Department, who has recently announced that he has accepted an invitation to visit the Columbia River Basin project this summer, has stated that he has directed the United States Reclamation Service to conduct the investigation of the proposed Columbia Basin and Umatilla Rapids reclamation projects. Congress recently appropriated \$150,000 for this investigation.

Secretary Work also announced that he had designated Assistant Secretary Goodwin, whose home is in Spokane, Wash., and Director Davis of the Reclamation Service, to advise him further as to the engineering, water, legal and other questions arising in connection with the projects.

Major-General Goethals, who has made some preliminary studies in connection with the projects for private interests, may be requested to act in an advisory capacity. On completion of the investigation, Secretary Work plans to submit a report and a recommendation to Congress.

Northern California Irrigation and Power Plant Planned

A proposal to develop 285,000 hp. from water secured from the Trinity River, in Trinity County, California, has been announced by W. H. Samson of Corning, Calif. It is the intention of Mr. Samson to develop this power and to use the water later for irrigating 400,000 acres of land in Glenn, Colusa, Yolo and Tehama Counties.

Mr. Samson and his associate, C. D. Hill, have been working on the project for some time and have filed many applications for water rights. The men have been aided in engineering work by Thebo, Starr & Anderton of San Francisco. The plan at present calls for a tunnel from Trinity County to the Sacramento Basin in Shasta County. Two hydroelectric plants are planned by the men. The estimated cost is \$30,000,000.

Pacific Gas & Electric Co. Will Improve Drum System

Increase in the water facilities of the South Yuba-Bear River development of the Pacific Gas & Electric Company, whereby an additional 25,000,000 kw-hr. will be added to the annual output of the system, has been announced as a part of the construction program for the coming year. The raising of Lake Fordyce dam and the making of numerous improvements in the system below Lake Spaulding are included in the work to be undertaken.

The present Lake Fordyce dam, which was built in 1881, is 800 ft. long and 90 ft. high, impounding 20,000 acre-ft. It is planned to raise the dam 47 ft., increasing the capacity to 47,000 acre-feet, or more than double the present capacity. The Drum canal will also be improved and a second penstock installed at the Drum Power House.

An afterbay or reservoir will be constructed in the Bear River gorge half a mile below the Drum Plant in order to conserve the additional water which will come from Lake Fordyce for use in the plants below.

Plans to Double Plant Capacity Made by Canadian Company

The West Kootenay Power & Light Company, of Rossland, B. C., a subsidiary of the Consolidated Mining & Smelting Company, has made application to the Provincial Department of Lands for permission to double the capacity of its power plant, at Bonnington Falls, near Nelson, B. C. The present plant has a capacity of about 30,000 hp. while the company owns a small auxiliary plant, at Grand Forks, which has a capacity of about 1,500 hp.

The extensions to the Bonnington Falls plant will necessitate the raising of the level of Kootenay Lake, and this, it is feared, may interfere with tentative plans that the provincial government had for reclaiming some swamp lands at Kootenay Flats.

The increased power is required for large industrial enterprises, and it is thought that this will outweigh any objections that the government might have with regard to the possible injury that the enterprise may have to its Kootenay Flats scheme. The increased power is needed primarily for the extension of operations at the Trail Smelter, where lead and copper are refined and zinc is produced electrolytically.

Recently the capacities of the lead and zinc plants have been doubled, and it is expected that this year the copper plant will be operated at capacity for the first time since its completion. Recently the Granby Consolidated Mining, Smelting & Power Company purchased the defunct Canada Copper Corporation's mine and concentrator, at Copper Mountain and Allenby, respectively, and it is prepared to enter into a contract with the West Kootenay company to take 5,000 hp. to operate machinery at mine and mill. Besides these large concerns, a number of small concerns are demanding increases in their power supplies.

By a vote of 30 to 10, the Senate body of the recent State of Washington Legislature in Olympia, Wash., passed the "Reed Power Bill" as the original measure came from the House, with slight amendments designed to prevent pyramiding of taxes by the municipality selling power. The bill provides permission for cities to sell power outside their corporate limits. The bill as it passed provides that the tax shall be collected by the city generating the power; it also carried a 5 per cent gross revenue tax, all of which goes to the state. The municipalities selling power are removed from the jurisdiction of the Department of Public Works for regulation and supervision. The bill contains a referendum clause.

Radio and Electrical Firms Are Ready for Exposition

Radio and electrical firms planning to exhibit their products at the Radio and Electrical Exposition to be held in San Francisco, April 3-8, have been busy preparing their booths in order to be ready on the opening day. In addition to the 144 display booths, which will contain radio and electrical equipment of interest to the public, there will be special entertainment for the visitors.

The radio exhibits will include the latest inventions and developments in both receiving and transmitting equipment and everything electrical will be displayed, from curling irons to large industrial motors. Manufacturers, dealers and power companies have been cooperating with the management of the exposition to make it a success.

A partial list of exhibitors is as follows:

Aerevox Company, S. F.
 Atlantic & Pacific Radio Laboratories, N. Y.
 Atlantic & Pacific Radio Supply Company, S. F.
 Brandes, Inc., N. Y.
 Bristol Company, Waterbury, Conn.
 Chas. Brown & Sons, S. F.
 California Electrical Construction Company, S. F.
 California State Association of Electrical Contractors and Dealers, S. F.
 A. D. Cardwell Company, Brooklyn, N. Y.
 Carter Radio, Chicago, Ill.
 Clapp-Eastham, Cambridge, Mass.
 Eiseman Magneto Company, N. Y.
 Electric Appliance Company, S. F.
 Electric Storage Battery Company, Philadelphia, Pa.
 Electrical Specialty Company, S. F.
 Formica Insulator Company, Cincinnati, Ohio
 Garnett Young & Company, S. F.
 Giffillan Bros., Los Angeles, Calif.
 Gillespie-Eden Electric Company, N. Y.
 Globe Commercial Company, S. F.
 Gould Storage Battery Company, N. Y.
 Geo. A. Gray Company, S. F.
 Great Western Radio Company, S. F.
 Hermans-Griffith & Company, S. F.
 Heintz & Kohlmoos, S. F.
 Home Radio Company, S. F.
 Kellogg Switchboard Company, Chicago, Ill.
 Colin B. Kennedy, St. Louis, Mo.
 Kilbourne & Clark, Seattle, Wash.
 Levy Electric Company, S. F.
 McGraw-Hill Company, S. F.
 Magnavox Company, Oakland, Calif.
 National Carbon Company, Long Island, N. Y.
 National Metal Moulding Company, Pittsburg, Pa.
 Pacific Gas & Electric Company, S. F.
 Pacific Radio Publishing Company, S. F.
 Pacific Radio Trade Association, S. F.
 Philadelphia Storage Battery Company, Philadelphia, Pa.
 Post Electric Company, N. Y.
 Radio Digest, Chicago, Ill.
 Radio Industries Company, N. Y.
 Remler Radio Manufacturing Company, S. F.
 E. M. Sargent Company, Oakland, Calif.
 Signal Electric Manufacturing Company, Menominee, Mich.
 Simplex Wire & Cable Company, Boston, Mass.
 Stromberg & Carlson Company, Rochester, N. Y.
 Trumbull Electric Manufacturing Company, Plainville, Conn.
 C. D. Tuska & Company, Hartford, Conn.
 Union Construction Company, Oakland, Calif.
 United Mfg. & Distributing Company, Chicago, Ill.
 Victory Radio Company, S. F.
 Warner Bros, S. F.
 Western Agencies, Inc., S. F.
 Westgate Metal Products Company, Oakland, Calif.
 The White House, S. F.
 Willard Storage Battery Company, Cleveland, Ohio
 Wilson-McGuire Company, S. F.

Unification of Utah Railroads Is to Be Considered

Commencing April 11, the Interstate Commerce Commission will conduct a hearing in the United States district court in Salt Lake City, Utah, for the purpose of determining the feasibility of grouping various Utah railroad units under the tentative plan outlined by the commission.

The hearing will be conducted by Commissioner Hall and two examiners and will be attended by government agents, representatives of the state utilities commission, railroad representatives and spokesmen for the traffic committee of the Salt Lake City chamber of commerce.

The inclusion of the "short lines" in the program for discussion is of particular interest to Salt Lake City because of the transportation importance of the interurban electric lines which serve this territory. The Bamberger Electric lines, the Orem lines and the Utah-Idaho Central Railroad are the short lines which will probably present their recommendations during the course of the hearings.

The tentative report of the Interstate Commerce Commission recommends that the Utah Railway be consolidated with the lines in Group 16, which includes the Denver & Rio Grande Western and the Western Pacific, but the report outline does not refer to the fate of the three interurban lines which serve Salt Lake City.

Construction of Steam-Electric Plant in Oregon Started

The Northwestern Electric Company of Portland, Ore., recently commenced the construction of an addition to its steam-electric generating plant in the northern city. The excavation and pile driving work has been completed and the concrete work is under way at the present time.

The addition to the plant will be in the form of a 10,000-kw. turbo-generator. It is the plan of the company to have the new unit in operation by September. The unit is being supplied by the Westinghouse Electric & Manufacturing Company.

The company has just completed lay-

ing a three-conductor 250,000-circ. mil, 11,000-volt, rubber insulated armored submarine cable across the Willamette River, near St. Johns. This cable is 2,000 ft. long. A similar cable, 1,300 ft. long, will be laid across the Willamette River at Sellwood, in the near future.

Construction on an outdoor type substation, which will cost in the neighborhood of \$75,000, has been started by the company at Vancouver, Wash. The capacity of the station will be 6,000 kw. and it will be used to step-down the 66,000-volt current to 11,000 and 2,400 volts. It is the company's intention to erect a 66,000-volt tie-line between Camas and Vancouver, a distance of 18 miles.

Large Transformer Order Placed by California Company

The Southern California Edison Company has placed with the Westinghouse Electric & Manufacturing Company an order for 2,000 distribution transformers amounting to approximately half a million dollars. The size of the contract, which is one of the largest ever placed for such apparatus, can be estimated by the fact that there are over thirty carloads of transformers in the order.

The transformers are to be used mainly for supplying power for motors for irrigating farm lands in southern California. This part of the state is dependent for practically all of its water supply upon wells, from which the water is pumped by electricity and distributed over the land in irrigation ditches; and for this reason the Southern California Edison Company is carrying out an extensive development of distribution lines throughout the territory which it serves.



Ground breaking for the addition to the steam-electric plant of the Northwestern Electric Company's plant in Portland, Ore., was viewed by only a few of the officials and employees of the company. Standing from left to right the men are: Tom Perry, superintendent of the Portland stations; E. F. Pearson, electrical engineer; C. J. Cook, excavation contractor; O. L. LeFever, general superintendent; L. T. Merwin, vice-president and general manager; A. N. Cudworth, auditor; A. W. Angell, purchasing agent; Jay Groo, sales manager; F. T. Hyskell, advertising manager; J. A. Hooper, operating department; W. Brenton, operating department; A. R. Boscow, industrial engineer, is sitting in the foreground.

Petition for Permit Conflicts With Earlier Request

A project which is in conflict with one for which the American River Water & Power Company has previously requested a preliminary permit, is the subject of the most important application presented to the Federal Power Commission at Washington, D. C., in the three-week period ended March 17. This application for a preliminary permit was made by Victor T. Matthews, who proposes to construct two storage dams on tributaries of the North Fork of the American River, in Placer County, California, to build a 300-ft. dam in the main stream, and a canal ten miles in length leading from the dam to a power house having a capacity of 12,500 hp.

An application was made by the Construction Company of North America for a preliminary permit to construct a dam and power house in the Sacramento River, near Keswick in Shasta County, California. The water stored behind the dam is to be used principally for power purposes, and also for sale to farmers and irrigation districts below the dam.

Three applications for licenses for small projects in California were received by the commission. These include one of the City of Sacramento, for small power development on the South Fork of the American River, to be used in a recreation park. Two small power projects on the Big and Little Kanatak Creeks in Alaska are the subjects of a request for license filed by B. A. Garber.

Officials of Radio Corporation Visit Pacific Coast

Interest in radio on the Pacific Coast has been heightened during the past fortnight by a visit to California of Major General James G. Harbord and



Major General James G. Harbord, president of the Radio Corporation of America, and Mrs. Harbord upon their arrival in San Francisco.

David Sarnoff, president and vice-president and general manager, respectively, of the Radio Corporation of America. The visits were the occasion for several

meetings both in San Francisco and Los Angeles in which the electrical industry participated.

Mr. Sarnoff was the principal speaker at a meeting of the San Francisco Electrical Development League and the Radio Trades Association on March 19 when he addressed the members of



David Sarnoff, vice-president and general manager of the Radio Corporation of America, and Mrs. Sarnoff.

those organizations on "The Message of Radio." In his address he outlined the development of the art of radio telegraphy and painted a vivid picture of the future of radio. He urged the electrical dealer to take the fullest advantage of the opportunity which radio presents to him and predicted that the industry will be fully as important as the automobile industry within the next decade.

General Harbord addressed several meetings including the Members' Forum of the San Francisco Chamber of Commerce. He was the guest of honor at a banquet given at the Palace Hotel by the Association of the Army of the United States, which was attended by over 500 army officers and prominent citizens. Mr. Sarnoff was also one of the speakers at this banquet.

General Electric Employees Are Offered New Saving Plan

As a result of the founding of a new savings plan for the employees of the General Electric Company, a new company, the General Electric Employees Securities Corporation has been formed. The new company will issue no-par capital stock which will be purchased by the General Electric Company and will also issue fifty-year bonds bearing 6 per cent interest. Employees of the General Electric Company may purchase bonds on monthly payments up to \$500 a year.

The new corporation will purchase securities of the General Electric Company and also those of public utilities with which the company has dealings. Seventy-five per cent of the securities will be secured from this last class of company.

Purchasing blocks of bonds from the securities corporation is not forced upon the employees, and divisions of the bonds will be as low as \$10. The corporation will add two per cent to the interest rate of the bonds as long as the holder is in the employ of the General Electric Company.

Development of Electric Power Planned by Sacramento

Plans for a complete hydroelectric project to supply the City of Sacramento, Calif., and the outlying districts with electrical energy and water have been completed and July 2, 1923 set as the date for an election under the California municipal utility district act. It is estimated that the project will cost \$8,000,000.

The development will be located on Silver Creek, a tributary of the American River. It will include the construction of a dam 130 ft. high at Ice House and a pipeline from the Union Valley damsite to the power house forebay above Big Bend. The pipeline will have a capacity of 450 sec.-ft. of water. The forebay will be of sufficient capacity to carry the plant for a day and a half. The first installation at Big Bend will include two 20,000-hp. units. It is estimated that the initial project will cost approximately, \$4,000,000.

Under the terms of the municipal utility district act, five directors will be elected who will be empowered to appoint a general manager, accountant, secretary, treasurer and attorney.

The aggregate development consists of three plants having a total capacity of approximately 150,000 hp.

Kettle Falls Plant to Be First Columbia River Project

The project of the Washington Water Power Company of Spokane, Wash., at Kettle Falls promises to be the first going hydroelectric project on the Columbia River proper. All plans have been completed to go forward with construction this summer. D. L. Huntington, the president of the company, conferred with officials of the Federal Power Commission last week in regard to the license to cover the project.

It is understood that J. L. Harper, the chief engineer of the Niagara Falls Power Company, has been engaged as a consulting engineer to assist in the preparation of the plans for the project.

The principal engineering problem involved is the construction of the spillway gates. On account of the restricted channel of the river and the depth of the water, the gates have to be as long as possible in order to avoid interfering with spillway capacity by the thickness of piers. Mr. Huntington has in mind the installation of gates 76 ft. long and has been visiting projects where the gates are of unusual length. It is believed, however, that there are no existing spillway gates of the length of those proposed for the Kettle Falls project.

Contract for power for driving the proposed Moffat Tunnel in Colorado, has not been let and will not be made until a decision of the courts permits the Moffat Tunnel Commission to start work on the tunnel. In the March 15, 1923, issue of the Journal of Electricity and Western Industry, it was stated that the Colorado Power Company of Denver, Colo., had been given the contract. This statement was in error, as at present the power company only serves the district adjacent to the proposed tunnel.



Members of the Boulder, Colo., Rotary Club were luncheon guests of the Western Light & Power Company recently. The meal was cooked entirely on electric stoves and was served in the Lafayette plant of the power company.

Electrically Cooked Meal Served to Boulder Rotary Club

That electricity will cook was clearly demonstrated recently to the Rotary Club of Boulder, Colo., when the weekly luncheon was set between the big turbines of the Western Light & Power Company at its Lafayette plant, twelve miles from Boulder. Seventy-five members were the guests of C. A. Semrad, general manager of the company, and all agreed that it was the most novel meeting ever featured by their club.

Three electric ranges were installed at the plant especially for the occasion by E. B. Ball, commercial manager, and M. E. Lanning of the Westinghouse Electric & Manufacturing Company in Denver. The latter did the cooking, starting the night before in order that oven space would be available immediately prior to serving the meal. Virginia baked hams in the quantity of 67 lb. proved the piece de resistance of the menu.

Plan to Have Mining Exposition in Salt Lake City, Utah

Plans are being laid for an international mining exposition to be held at Salt Lake City, Utah, during the fall of 1925. Preliminary plans for the exposition are in the hands of an exposition committee, of which H. S. Joseph is chairman, and H. C. Goodrich and C. C. Boswell are the other two members. The Salt Lake City chamber of commerce is strongly behind the project, and it also had the endorsement of the last Utah legislature.

Not only will the mineral resources of Utah be given publicity, but the exposition will be international in scope. As soon as practical the committee will work to have President Harding and Congress take favorable action on the plan. Later the interest of foreign nations will be enlisted.

Washington Utilities Men Discuss Securities Company

About 150 electric power and light men, representing the 247 cities and towns served by the Puget Sound Power & Light Company, were present at a convention held in the Henry Building in Seattle, Wash., recently. The purpose of the meeting was to discuss

plans for the new Puget Sound Power & Light Securities Company. This latter company was recently organized to handle the stocks, bonds and other securities of the parent company.

The men in attendance were introduced to the officers of the North Coast Power Company and the Washington Coast Utilities Company, the companies which were recently taken over by the Puget Sound company. Speakers at the meeting included: A. W. Leonard, president of the Puget Sound Power & Light Company; W. H. McGrath, vice-president of the company; H. G. Gille, sales manager of the corporation; Frank Dabney, manager of the new securities company; F. W. Brownell, comptroller of the securities company, and Captain N. W. Brockett, tax agent of the Puget Sound Power & Light Company.

List of "Directors' Nominees" Is Announced by A.I.E.E.

At the meeting of the board of directors of the American Institute of Electrical Engineers held in New York, March 16, the report of the committee of tellers, on its canvass of the nomination ballots cast for candidates for the Institute offices falling vacant July 31, 1923, was presented.

As required by the constitution of the Institute, the board then selected by ballot its list of "Directors' Nominees," with the following result:

For president: Harris J. Ryan, Stanford University, Calif.

For vice-presidents: District No. 2 (Middle Eastern), William F. James, Philadelphia, Pa.; District No. 4 (Southern), H. E. Bussey, Atlanta, Ga.; District No. 6 (North Central), Herbert S. Sands, Denver, Colo.; District No. 8 (Pacific), J. E. Macdonald, Los Angeles, Calif.; District No. 10 (Canada), S. E. M. Henderson, Toronto, Ont.

For managers: H. P. Charlesworth, New York, Y. Y., William M. McConahay, Pittsburgh, Pa., W. K. Vanderpoel, Newark, N. J.

For treasurer: George A. Hamilton, Elizabeth, N. J.

The election ballots, including the names of the Directors' Nominees and all other eligible candidates, have been mailed to the membership.

Electragists' Representatives Will Tour Continent

At the executive committee meeting of the Association of Electragists, held in New York City March 14-15, it was decided that James R. Strong and Laurence W. Davis, president and director of promotion and development respectively, of that organization, should take a transcontinental trip during the coming summer. The object of the trip is to hold divisional meetings of the membership.

The two men will stop at divisional points and in some other cities, in order to allow contractor-dealer members of the organization to attend a meeting of the body. The executive committee of the association feels that all members should have the opportunity of attending at least one meeting a year, and the divisional meetings will in a way supplement the national one.

Tentative dates for the divisional meetings to be conducted by Messrs. Strong and Davis in the western states are as follows: Denver, Colo., July 16; Salt Lake City, Utah, July 18; Los Angeles, Calif., July 20; San Francisco, Calif., July 23; Portland, Ore., July 25; Seattle, Wash., July 26; and Vancouver, B. C., July 27.

Dates for the display of electrical homes in California under the direction of the California Electrical Cooperative Campaign have recently been set. The four different exhibits now definitely decided upon cover a period of two months. The dates are as follows: Fresno, April 12-29; San Francisco, May 3-19; San Diego, May 17-June 3; and Sacramento, May 31-June 16.

Hetch Hetchy dam on the Tuolumne River, which has just been completed, has been named O'Shaughnessy Dam after M. M. O'Shaughnessy, chief engineer of the City and County of San Francisco. The Board of Supervisors of that city, upon the recommendation of the San Francisco Chapter of the American Association of Engineers, adopted resolutions naming the dam after City Engineer O'Shaughnessy, who has had direct supervision over the construction of the project which will furnish water and power to the city.

Complete First Unit of General Electric Oakland Plant

The first unit of the General Electric Company's plant at Oakland, Calif., comprising a service shop and a switch-board and transformer factory, was completed during the past fortnight. The building is a steel and brick class "B" structure, 335 ft. long by 135 ft. wide, containing 45,000 sq. ft. of floor space.

The building is attracting much attention on account of the completeness of its electrical equipment and its high class lighting installation. It is equipped with a 5-ton electric crane and is protected against fire by a 50,000-gal. steel water tank. It is served by two trans-continental railroads.

A complete description of the new structure together with photographs will appear in a forthcoming issue of the Journal of Electricity and Western Industry.

New Member Appointed to Utah Utilities Commission

Thomas N. McKay, of Huntsville, Utah, has been appointed by Governor Mabey to succeed Judge Joshua Greenwood as a member of the Public Utilities Commission of Utah, Judge Greenwood's term having expired.

Mr. McKay, who has extensive farming interests in Utah, has taken a prominent part in public affairs for the past several years, and has been a member of the state senate for several terms. He was president of that body at its last session.

The Florence Electric Company, of Florence, Ore., has recently decided to erect a power plant on Sweet Creek. Extensions of transmission lines to Mapelton, up the north fork of Sweet Creek, are also planned by the company.

Pacific Coast Convention Plans Have Been Announced

Plans for the Seventh Annual Convention of the Pacific Coast Electrical Association, to be held in San Francisco, June 19-23, have been rapidly put into shape. The committees in charge of arrangements, have recently announced a program for the days of the convention.

The opening day, June 19, will be devoted to registration, and in the evening moving pictures arranged for by the publicity committee, will be presented to the visitors. The formal opening of the convention will take place on the morning of June 20, at which time James B. Black will give the President's Address. Technical and Commercial Section meetings will be held that afternoon and informal dancing and entertainment will be provided for the evening.

Technical and Commercial Section meetings will be continued on the morning of June 21 and the afternoon will be devoted to golfing. The Second Business Session will be held on the next morning and the Western Conference is scheduled for the afternoon of June 22, with the banquet following that evening. On Saturday the convention delegates will take the trip up Mount Tamalpais, and into Muir Woods. Those who desire to do so may stay overnight on the summit of the mountain. This trip will close the convention.

The Puget Sound Power & Light Company and the Pacific Northwest Traction Company will spend a total of \$425,000 this year in extensions and improvements in Whatcom and Skagit Counties, all of which is for the purpose of giving increased and improved service.

Utah Power & Light Company Is Adding Rural Customers

The Utah Power & Light Company, during the past fall, completed the construction of a 44,000-volt transmission line from Menan to St. Anthony, Idaho, and the transmission line which this new construction replaced is now being operated at 11,000 volts for distribution purposes. Energy for this service is obtained from substations at Menan and Rexburg.

This 11,000-volt line is available for service to residences and communities adjacent to or near it, and lines have recently been extended to Burton, where about forty-five new customers are obtaining electric service.

Books and Bulletins

ENGINEERING ECONOMICS

By JOHN C. L. FISH, professor of railroad engineering, Leland Stanford University. 311 pages. 6 by 9 in. Illustrated. \$3. Published by McGraw-Hill Book Company, Inc., New York.

This is the second edition of this book on the application of economics to engineering, the first edition being published in 1915. The author believes that engineering knowledge can be converted into community service only through the medium of business and consequently the engineer's contribution to public welfare depends largely on his understanding of the business side of engineering.

The text covers the subjects of analysis of problems of investment, interest and time value of money, practical analysis of first cost, business units, business statistics, valuation, engineering reports and miscellaneous reports.

The question of economics in general is one that is now attracting considerable attention and it is quite appropriate that economics as applied to engineering should be given an impetus at this time.

The author is to be commended on the thorough and painstaking effort shown in this book. Wherever necessary he has made use of mathematics in illustrating a law,—the chapters on interest and valuation being particularly good examples of this method of treatment.

In this second edition certain changes in the mechanical features of the book have been introduced. Chapter I begins with section 101, Chapter II with section 201, and so on, and each table, equation, and figure is designated by the number of section in which it makes its first appearance. This method is no doubt of value in class room work, but its usefulness in a reference book is questionable as it may be somewhat confusing.

About eighty pages of the text are devoted to an appendix which is divided into four sections, Appendix B consisting of tables of formulas and values is particularly valuable, while Appendix D consists of a good collection of questions and problems.

As a text for class room work and as a reference book for practicing engineers, a book of this nature should have a wide field of usefulness.

E. R. S.



Architect's drawing of proposed \$3,000,000 Olympic Hotel, which will be built in Seattle, Wash., from funds raised by popular subscription. George B. Post & Sons, New York, prepared the plans, represented by Bebb & Gould in Seattle. The building will be 12 stories high, containing 650 rooms, each with bath attached. A huge roof garden, dining room with capacity of 400 diners, grill room accommodating 200 and coffee shop with room for 500 guests, are features of the proposed structure. The first four floors of the building will be of steel, and the remaining of reinforced concrete. Work of wrecking the present buildings on the site at Fifth Avenue and Seneca Street, is under way, and contract for excavating will be let immediately.

Meetings

Contractor-Dealers to Discuss Technical Subjects

At a recent meeting of the Electrical Contractors and Dealers' Association of San Francisco, it was decided that it would be for the good of the organization to devote a part of the time at the weekly luncheons of the Association to the discussion by the members of technical electrical subjects. The members present suggested that certain men were particularly well fitted to give advice on certain phases of wiring standards and that consequently these men could and should give this definite information to the entire membership.

A suggestion was also made that the Association have prepared a set of blueprints, showing typical installations that are correct in San Francisco. It was the opinion of the organization that information on mechanical details of electrical installations could be better portrayed by means of diagrams than in any other way. This matter was later referred to the standardization committee of the organization.

In a talk presented by Ray Brouillet, the sales manager of the Anderson Smith Company, automobile dealers in the city, the electrical men were urged to practise creative selling. Mr. Brouillet, formerly a wiring contractor, told the contractor-dealers that they were not getting the most out of their business, if when they completed an installation they did not go to the owner of the building and sell him appliances to be used in connection with the wiring installed.

The Association members decided to have a speaker from outside of the organization address them on the last Thursday of each month. When speakers are invited to attend, the meetings will be considered to be open.

San Diego Electric Club Makes Plans for Home Display

Details concerning the electrical home to be displayed in San Diego, Calif., May 17-June 3, were discussed at the evening meeting of the Electric Club of San Diego, on March 27. The organization is endeavoring to cooperate with the California Electrical Cooperative Campaign in every way possible so that the two may present one of the most successful electrical homes that has been shown the public so far.

Walter Wurfel, former president of the club, presided at the meeting and before introducing Frank Smith, Los Angeles representative of the California Electrical Cooperative Campaign, gave the men some of the ideas of the committees in charge. During the meeting, A. E. Holloway, superintendent of the commercial department of the San Diego Consolidated Gas & Electric Company, made assignments of privileges as to appliances and other exhibits. These rulings were made in the meetings of the committee on exhibits.

Furniture men of the city told the electrical men of the part that they

intended to play in exhibiting the home. The meeting was then thrown open to general discussion and various members spoke from the floor concerning the home.

Engineers Regional Meeting to Be Held in Los Angeles

The opening sessions of the Pacific Coast Section of the American Society of Mechanical Engineers to be held in Los Angeles, Calif., April 16, will be devoted to technical subjects, according to announcements of the committee on arrangements. Illustrated addresses on the hydroelectric development of California will be presented to the engineers. The second day will be devoted to automobile trips of inspection, the tour to include the California Institute of Technology and the laboratory of the Mount Wilson solar observatory, where the night will be spent. The final day, April 18, will be spent in a tour of the oil fields of southern California.

Among the officers and past officers of the society to be present are: John L. Harrington, Kansas City, president of the society; Dr. Ira N. Hollis, Worcester, Mass., past president; and Calvin W. Rice, New York City, secretary of the organization.

Washington Power Line Is to Be Extended to Orchard District

The Washington Water Power Company has an extension of its Central Washington transmission line under construction to reach Quincy, in the heart of the famous Quincy Flats. It will carry power for use in pumping largely, that being the only method of irrigation in use there. The extension will be about 20 miles in length and will serve Winchester and Quincy and the adjacent orchard tracts and farms.

COMING EVENTS

Radio and Electrical Exposition—

Civic Auditorium—San Francisco, Calif.
April 3-8, 1923

American Society of Mechanical Engineers—

Pac. Coast Regional Meeting—Los Angeles, Calif.
Apr. 16-18, 1923

Southwestern Public Service Association—

Annual Convention—Fort Worth, Tex.
May 15-17, 1923

National Electric Light Association—

Annual Convention—New York, N. Y.
June 4-8, 1923

Pacific Coast Electrical Association—

Annual Convention—San Francisco, Calif.
June 19-22, 1923

Northwest Electric Light and Power Association

Annual Convention—Seattle, Wash.
June 27-30, 1923

American Institute of Electrical Engineers—

Pacific Coast Convention—Del Monte, Calif.
Sept. 26-29, 1923

Hearings for the purpose of obtaining the views of California interests on the proposed consolidation of railroads to be held by the Interstate Commerce Commission will be conducted in San Francisco on April 2, and in Los Angeles on April 7. The hearings were originally scheduled for March 31 and April 7, respectively.

Contractor-Dealers to Meet at Donner Lake in June

Donner Lake, in the Lake Tahoe region of California, has been chosen as the site for the annual meeting of the California State Association of Contractors and Dealers. The meeting will be held there June 9-16 and during the week plans call for all kinds of entertainment for the assembled electrical men and their wives and children.

The resort is essentially a camp, and the men and their families in attendance at the meeting will live in well constructed tent-houses. It is the plan of the committee in charge to make the week a summer vacation outing for the members of the association and in this way allow them to combine business and pleasure.

The plans as formulated, call for a motor caravan starting from San Francisco on June 9 and being joined by the Sacramento, Stockton and San Joaquin Valley contingent at Sacramento. Other delegates will motor direct to the lake. Full details have not been determined upon yet, but members will be advised in time to permit them to make all arrangements.

The committee in charge of the meeting has secured the exclusive use of the resort for the contractors and dealers for the week and has also provided for special rates for the convention visitors. Meals may be secured at the main dining hall or families wishing to do so may do their own housekeeping.

Committees for San Francisco League Are Appointed

Standing committees for the year 1923 for the San Francisco Electrical Development League were recently appointed by Louis F. Leurey, the newly elected president of the organization. The new committees have already taken up their duties and will be responsible for the work assigned to each during the remainder of the year.

The members of the electrical industry in San Francisco that have been appointed on the committees are as follows:

Public Relations Committee: W. S. Berry, chairman; A. H. Elliot, Garnett Young, F. A. Leach, Jr., C. L. Chamblin, R. A. Hudson, E. O. Shreve.

Program and Educational Committee: C. B. Kenney, chairman; L. J. Brown, A. E. Rowe, Francis Watts, James Redpath, Jack Stewart, A. H. Elliot, Louis Levy, M. H. Schnapp, M. W. Scanlon, W. W. Hicks, Ralph DuVal.

Central Bureau of San Francisco Organizations: R. A. Balzari, chairman; C. L. Chamblin.

Fraternal and Attendance Committee: Jack Hassett, chairman; George Curtiss, G. W. Barker, M. H. Jones, M. S. Barnes, R. E. Martinez.

Membership Committee: R. F. McDonald, chairman; H. N. Nelson, Arthur Dahl, W. B. Francis, Charles Langlais, Edward Nelson, Walter Sultan, William Tardif, G. D. F. Smith, Willard Johnson.

Publicity Committee: E. C. Portman, Jr., chairman; M. W. Scanlon.

Finance Committee: F. J. Cram, chairman; James Lavenson, E. C. Kinsey.

Properties Committee: Henry Bosch, Jr., chairman; H. F. Yost, V. W. Hartley.

Historical Committee: C. A. Loring, chairman; S. H. Taylor, Henry Bostwick.

Technical Committee: H. W. Crozier, chairman; C. W. Mitchell, R. W. Wiley, G. E. Kimball, W. L. Winter, F. O. Sievers, E. W. Stone.

C. F. Henderson, F. R. George, A. H. Nicoll, G. H. Hagar, V. D. Cousins.

The Public Utilities Commission of Utah has dismissed the application of Cedar City, Iron County, for an order authorizing the construction of a municipal lighting plant.

Personals

Perry O. Crawford, chief engineer of The California Oregon Power Company, has been named vice-president and chief engineer of the company. Mr. Crawford was born in Malvern, Ohio, and received a degree of A.B. in electrical



PERRY O. CRAWFORD

engineering from Stanford University in 1908. From 1908 to 1911 he was construction engineer with the Northern California Power Company and built the South, Inskip and Coleman power houses for that company. In 1912 he went to Afghanistan as assistant engineer on government hydroelectric work and for three years was in charge of work on the Jabl-us-siraj plant. After returning to the United States he spent six months at Stanford in research work under Professor Harris J. Ryan. Mr. Crawford has been with The California Oregon Power Company since 1916, having been chief engineer since 1918. He has had charge of all engineering activities of the company since his affiliation with it, including the construction of the Copco Dam and both units of the Copco Power House.

William Hubert Burr, noted civil engineer whose home is in New Canaan, Conn., recently inspected the site of the proposed bridge across San Francisco Bay at Carquinez Straits. Mr. Burr was formerly professor of civil engineering at Rensselaer Polytechnic Institute and Harvard University. For a time he was consulting engineer for both the state and city of New York.

Edwin L. Andrew has been appointed assistant to the manager of the department of publicity of the Westinghouse Electric & Manufacturing Company with headquarters in East Pittsburgh. It will be remembered that Mr. Andrew was a recent Pacific Coast visitor.

Francis C. Shenehon has been made vice-president and general manager of construction and engineering of the Byllesby Engineering and Management Corporation. Mr. Shenehon is a widely known hydraulic engineer and was for a number of years dean of the college of engineering and architecture of the University of Minnesota.

H. T. Dyett, president of the Rome Wire Company, Rome, N. Y., accompanied by J. G. Pomeroy, western representative of the company, with headquarters in Los Angeles, is a recent San Francisco visitor.

J. F. Johnston, who for the past three years has been a member of the engineering department of The California Oregon Power Company, has joined the drafting department of the Portland Railway, Light & Power Company.

E. A. Carter, Salt Lake City representative of the Eureka Vacuum Cleaner Company, has returned to his headquarters after attending the national sales convention of that company in Detroit.

Harry P. Rees, instructor in electrical engineering, San Pedro High School, and George E. Springer, instructor of electrical engineering, Manual Arts High School, were the chief speakers before a recent meeting of the Los Angeles Electric Club. Both men told the members of the organization of the work which is being done in their respective schools in the electrical departments.

Lewis Degen, consulting electrical signal engineer of Berkeley, Calif., has been retained by the City of Los Angeles to supervise the installation of a \$1,500,000 fire alarm system. Mr. Degen has spent many years in South America, installing the first electric street railway on that continent in Rio de Janeiro in 1890 and later acting as consulting signal engineer for the Brazilian government for eight years. During this time he installed what was then the largest police and fire alarm system in the world at Rio de Janeiro. He returned to the United States in 1913 and in 1914 prepared plans for a new fire alarm system for Los Angeles.

Kenneth V. Laird has been placed in charge of the newly organized transmission and street lighting department of the Capital Electric Company, jobbers, of Salt Lake City. Mr. Laird is a graduate of the University of California with the class of 1914. Prior to the war he was a member of the engineering staff of the Anaconda Copper Mining Company and more recently he has been acting as electrical engineer for the Gillert Engineering Company of Philadelphia.

R. P. Tracy of Manning Bowman Company, manufacturers of heating devices, New Britain, Conn., is a recent California visitor.

Paul P. Ashworth, distribution engineer of the Utah Power & Light Company, has been unanimously re-elected to represent the Utah section of the American Institute of Electrical Engineers on the governing board of the Engineering Council of Utah. His term of office will expire Jan. 1, 1925.

O. J. Kelvey, formerly street lighting specialist of the General Electric Company's Buffalo office, has just recently joined the Los Angeles office of that organization and will have charge of street lighting equipment sales.

Elbert Kramer, heating specialist in the San Francisco office of the Westinghouse Electric & Manufacturing Company, has severed his connection with that company to become associated with Landers, Frary & Clark in the exploitation of that organization's merchandising lines in the Los Angeles territory.

J. F. Dostal, manager of the Colorado Springs Light, Heat & Power Company and president of the Rocky Mountain Division of the N.E.L.A., attended the national executive committee meeting of that organization in Chicago, on March 22.

A. H. Seep, one of the officials of the Mine & Smelter Supply Company, is taking an active interest in the construction of the new buildings at Regis College in Denver.

D. C. McClure, electrical superintendent of the Denver Gas & Electric Light Company, has returned from an extended trip to New York in the interest of the new power plant which will be built by the Doherty interests near Boulder, Colo.

C. C. Burt, of Salt Lake City, Utah, has been elected delegate to the national convention of the American Association of Engineers, to be held at Norfolk, Va., in May, by the Salt Lake City chapter of the association. H. S. Kleinschmidt was named alternate.

Clare N. Stannard, George W. Bixler, and F. F. McCammon of the Denver Gas & Electric Light Company; Ben S. Read of the Mountain States Telephone & Telegraph Company; L. M. Cargo of the Westinghouse Electric & Manufacturing Company; E. C. Stenger, receiver of the Denver Tramway Company, and D. D. Sturgeon, Denver electragist, are on the committee of 200 headed by Mayor D. C. Bailey of Denver, Colo., which is to be in charge of the Pageant of Progress to be held in that city in July.

Lester S. Ready, formerly assistant chief engineer of the California Railroad Commission, has been appointed chief engineer, succeeding Richard Sachse, resigned. Mr. Ready is a graduate mechanical engineer of the University of California and was a gold medal student in the class of 1912. Following his graduation he spent a year in the distribution department of the Pacific Gas & Electric Company and since 1913 has been with the Railroad Commission. For five years he held the position of gas and electrical engineer and in 1919 he was made assistant chief engineer, which position he held



LESTER S. READY

at the time of his recent appointment. A. V. Guillou, who has been assistant engineer in the gas and electric division for the last three years, has been named gas and electrical engineer in charge of the division, succeeding Mr. Ready.

F. E. Boyd, manager of the motor department in the San Francisco office of the General Electric Company, recently left for New York City, where he will spend some time in the interests of his company.

J. J. Canavan of Los Angeles and San Francisco was a recent Portland, Ore., visitor. Mr. Canavan plans to open a branch office in Portland for the sale of Walker Electric Trucks.

S. W. Bishop, executive manager of the Denver Electrical Cooperative League, was the chief speaker on the radio broadcasting program of the Winner Corp., in that city, March 7.

E. C. Headrick, past chairman of the Electrical Cooperative League in Denver, Colo., attended the national executive meeting of the Association of Electragists' International in New York City, March 14-15, as the representative of the mountain division.

George O. Queen, for many years connected with the Gillespie-Eden Corporation and more recently in charge of that company's Pacific Coast service, has taken up similar duties with Landers, Frary & Clark with headquarters in the Call Building, San Francisco.

N. C. Harvey, of the Illinois Electric Company of Chicago, who has been spending the winter season in Los Angeles and Pasadena, has just recently returned to his Chicago home.

R. S. Rubincam has been appointed local manager of the Mine & Smelter Supply Company in Denver, Colo., to succeed S. M. L. McSpadden who resigned.

F. F. Miller, an old time Denver contractor, is the latest addition to the membership ranks of the Electrical Cooperative League in that city.

George H. Curtiss, for the past five years sales manager of the Electric Railway & Manufacturers Supply Company of San Francisco, in company with Rosse M. Gilson, has organized an independent electrical supply jobbing business to be known as the Universal Electric Company, with headquarters at 137 Sixth St., San Francisco. Mr. Curtiss has been identified with the electrical industry for more than 25 years. He began his career in the industry as a repair man and later entered the contracting business. He was for some time connected with the sales department of the Pacific States Electric

C. E. Groesbeck, formerly vice-president and general manager of the Utah Power & Light Company, and now vice-president of the Electric Bond & Share Company of New York, was a Salt Lake City visitor during the latter part of March. Mr. Groesbeck, who is accompanied by Mrs. Groesbeck, continued on to the Pacific Coast on a vacation trip. While in Salt Lake City he conferred with officials of the Utah Power & Light Company.

C. Melville Dollar has been elected chairman of the Shipping Bureau of the Vancouver Board of Trade.

Jack West of the sales department of the Denver Gas & Electric Light Company has been placed in charge of the sales floor of the company.

R. W. Goddard, dean of engineering at the New Mexico College of Agriculture and Mining, recently spoke before the Albuquerque section of the American Association of Engineers on the proposed bill to license engineers which is before the New Mexico State Legislature.

Edmund Lang, vice-president of the Crocker-Wheeler Company, Ampere, New Jersey, is a recent San Francisco visitor. Mr. Lang came from New York with a party of friends through the Panama Canal in a private yacht.

Stacy Hamilton, assistant to the president, Portland Railway, Light & Power Company, is a recent San Francisco visitor.

T. W. Ness, sales manager of the Holtzer-Cabot Electric Company of Boston, Mass., is visiting the Pacific Coast at the present time.

Hoyt Catlin, advertising manager of the Bryant Electric Company, Bridgeport, Conn., is a recent Pacific Coast visitor.

Dean D. Clark, Denver commercial manager of the Mountain States Telephone & Telegraph Company, has been appointed a member of the Advisory Board of the Electrical Cooperative League in that city.

F. J. McEniry, field representative of the Electrical Cooperative League, and George E. Lewis of the Rocky Mountain Committee on Public Utility Information, were the speakers at the weekly radio matinee of the league in Denver, March 15.

Robert Treat, engineer of the lighting department of the General Electric Company with headquarters in Schenectady, has been spending considerable time on the Pacific Coast in the interests of his company.

J. H. Knost, branch manager of the Tucson office, Westinghouse Electric & Manufacturing Company, and Walter G. Willson of the same office, recently spent several days in Los Angeles completing arrangements of large orders which they have secured in the mining districts of Arizona.

E. B. Whipple, manager of the Whipple Electric Company, Provo, Utah, has been elected exalted ruler of the Provo lodge of Elks.

W. C. Sears, Pacific Coast representative of Landers, Frary & Clark, has just concluded an extended visit in Los Angeles and southern California, going over the local territory with the company's representatives in this section.

S. P. Russell, of H. B. Squires Company of San Francisco, was a recent Los Angeles visitor.

Charles Heston Pierson, supervisor of publicity of the Southern California Edison Company, recently celebrated his fiftieth anniversary as a writer for American newspapers. "Charlie" started his newspaper work as a reporter for the Progressive Batavia, the local paper in the western New York town in which he was born, during his twelfth year. After varying experiences as telegraph operator, train despatcher and correspondent for metropolitan papers he joined the staff of the Buffalo Times, then a struggling morning paper, owned



CHARLES HESTON PIERSON

by Norman E. Mack, now one of the big political leaders of America. For many years, subsequently, he was connected with the Associated Press as a member of its Albany and Washington staffs and as night city editor at the main office, corner of Dye Street and Broadway, New York, which at that time was considered the center of news of the western hemisphere. Coming to California in 1900 as Pacific Coast press agent for the Pan-American Exposition, "Charlie," after the fashion of other legions before and after him, became enamored of southern California. The old Morning Herald introduced him to his first California newspaper audience in 1903. For several years thereafter he was identified with the Hearst papers until 1908, when he was appointed publicity director for the Southern California Edison Company, in which service he still continues.

R. D. Walker, president of the Walker & Pratt Manufacturing Company, has returned to Boston after spending several weeks in various Pacific Coast cities.

C. E. Pillars and R. H. Hamel have been appointed as inspectors in the city electrical department by Mayor Dewey C. Bailey of Denver.

R. F. Del Valle has been re-elected president of the Los Angeles Board of Public Service Commissioners. Mr. Del Valle is beginning his fifteenth year as head of the board which supervises the operations of the city's water, power and light systems.

E. M. Cutting, formerly western representative of the Edison Storage Battery Company, has joined the sales department of the Atlantic-Pacific Radio Supplies Company. Mr. Cutting is well known to the electrical industry of the West. He was one of the first presidents of the San Francisco Electrical Development League.



GEORGE H. CURTISS

Company and later joined the "Ermsco" organization. Mr. Curtiss is an active figure in the electrical industry, having taken an active part in all conventions and in the affairs of the San Francisco Electrical Development League.

Manufacturer, Dealer and Jobber Activities

The H. M. Thomas Company has recently been appointed California representative for the Pure Carbon Company, Wellsville, N. Y. The Thomas company has offices in the Oakland Bank Building, Oakland, Calif., and in the Title Insurance Building, Los Angeles, Calif.

The Electric Novelty Works has moved from 533 Mission Street, San Francisco, to 965 Howard Street, in the same city. V. Sollman is proprietor of this firm which manufactures electrical connections.

The Robbins & Myers Company, of Springfield, Ohio, manufacturers of all types of electric motors, generators and fans, has announced the appointment of H. H. Beck as its advertising manager. Mr. Beck came to the Robbins & Myers Company from Erwin, Wasey & Company, Chicago advertising agents, with whom he has been associated for the past few years. His connection with the Robbins & Myers Company became effective on March 1.

The Dryer Electric Company, a contractor-dealer firm of Glendale, Ariz., has recently moved into larger quarters in the business district of the Arizona town. The company plans to carry a new and large stock of electric fixtures in order to serve the towns of Glendale, Peoria and Scottsdale. The firm also installs power plants on farms in the vicinity.

The General Electric Company has recently published Bulletin No. 46,053 which is devoted to a description of its portable timing device. This piece of equipment consists of an encased clock, to be used with a standardized clock as a means of secondary timing, to supplant the stop watch. The device has applications which enable its use with graphic instruments.

The Standard Electrical Repair Company has recently moved from Burlingame, Calif., to 3478 Mission Street, San Francisco. H. Schade is proprietor of the firm which does electrical repair work.

S. Robert Schwartz & Brother, of New York City, manufacturers of Es-robot portable lamps, have recently placed on the market a new lamp which combines a number of new features. The lamp is known as the Q-Ray therapeutic lamp. The lamp is fitted with a shade which produces parallel rays, thus avoiding the danger of burns due to the focusing of heat at one point.

The Crooks-Nathan Household Appliance Company of Denver, Colo., has recently moved from 1648 California Street to the Commonwealth Building.

The Hinde Electrical Company, of Loveland, Ohio, recently fitted up a small automobile to be used by salesmen demonstrating small home lighting plants. The automobile has been converted into a moving store and enables the salesman to display the power plant on the farmer's own ground.

The City Electric Company, Tacoma, Wash., has moved to new quarters at 11 South 11th Street. T. J. O'Keef is manager of the company.

The Killark Electric Manufacturing Company, of St. Louis, Mo., is placing on the market a new bell-ringing transformer, which has been designed to take up minimum space so that it will fit in a standard box. The transformer is designed to be used on 110-volt, 60-cycle alternating current circuits and delivers eight volts on the secondary.

The Leo J. Meyburg Company, of San Francisco, has recently moved from 428 Market Street, to 973 Mission Street.

The Power-Brown Electric Company, Spokane, Wash., recently received contract for installing all the wiring, electric equipment and fixtures in the new Chelan County courthouse, on a bid of \$11,694.



By using the newly developed electrical Inkto-miter, manufactured by the Hootenany Calibrating Company, of ZaZaxaville, Guatemala, the photographer was able to obtain the highly valuable picture reproduced above. W. E. Andrews, San Joaquin Valley representative of the Alexander & Lavenson Electrical Supply Company, was chosen the subject for the trial of the Inkto-miter. "Bill" was particularly anxious to have the test made for he wanted to see if the device would really record what he was thinking about. The answer to his question will be left to the reader. Bill had the picture taken just after he purchased a new putter and a dozen golf balls in a San Francisco store.

The Electric Shop of D. C. Bacon is the newest electrical store in Phoenix, Ariz. D. C. Bacon, the owner, has been in the electrical contracting and dealing business in Phoenix for a number of years, having been associated with L. J. Bohn in the Arizona Electric Company there.

The Highland Park Electric Shop, of Los Angeles, Calif., has recently moved into a new and larger store at 5903 Pasadena Avenue. George L. Barnes is proprietor of the establishment.

The P. A. Geier Company, of Cleveland, Ohio, has recently announced a spring house cleaning sales contest open to retail salesmen. Prizes of cash or merchandise will be given to the leaders and others who qualify with a reasonable number of sales. The contest extends from April 2 to June 2.

The Ohio Electric & Controller Company, Cleveland, Ohio, has placed on the market a motor-generator set which is suitable for home charging of radio and automobile batteries, at any desired rate from one to twenty amperes. An ammeter and rheostat are provided to permit the battery owner to regulate the charging rate. The new set is claimed by the manufacturers to be nearly noiseless.

The Hardin Light & Power Company, of Hardin, Mont., has recently moved to the Sullivan Building in the Montana town. The new store will give the company more space for keeping electrical supplies, and also room for the repair department conducted.

The Hurley Machine Company, of Chicago, Ill., has recently placed on the market a new line of electric washing machines, to supplement the Thor line. The new models will be known as the Superior line and will retail at prices below the Thor models. The new line includes washers of the oscillating type, vacuum cup type and a complete group of single and double wood and copper tub dolly type washers.

The South Pasadena Electric Shop has recently been opened by C. M. Jeffries to do a general electrical contracting and dealing business in South Pasadena, Calif. The new store is located at 1615 Mission Street in the southern city.

The Uehling Instrument Company, Paterson, N. J., manufacturer of CO₂ recorders and other power plant gages, has placed Charles J. Schmid in charge of sales in Greater New York and Long Island. Mr. Schmid is well qualified for his duties in that territory due to his close contact with power plant operators in the interest of fuel economy when formerly in charge of the Boston office.

The Willard Electric Company is a new electric shop opened by E. Willard at 112 East Winston Street, Los Angeles, Calif.

The Cutler-Hammer Manufacturing Company, of Milwaukee, Wis., has recently completed installation of a C-H magnetic clutch which is attached to a 300-hp. synchronous motor in the establishment of the National Elevator Company of South Chicago, Ill. The motor replaces the steam equipment of the company and permits a saving of about \$8,000 a year.

The Square D Company, Detroit, Mich., has recently put on the market a new antenna insulator of porcelain, finished in dark brown glaze. The insulator has a tensile strength of 350 lb.

The Bell Novelty & Electric Shop, an electrical contractor-dealer firm of Bell, Calif., has recently been purchased by R. L. Linn, of that place. Mr. Linn was formerly interested in the company and has now obtained sole ownership.

Eddings & Gill, a contractor-dealer organization of Glendale, Calif., has recently opened a new place of business at 450 Los Felis Boulevard, in the southern California town.

C. E. Ingalls, of San Francisco, Calif., has recently been appointed representative of the Copper Clad Steel Company of Braddock, Pa., to have the states of California, Arizona, and Nevada. Mr. Ingalls' office is in the Rialto Building.

Trade Outlook

San Francisco

Business conditions in the territory surrounding San Francisco and in the city itself are showing tendencies to advance rapidly. Manufacturing industries are noticing an increase and there is no evidence of a buyer's strike. The rise in commodity prices has been felt only slightly and purchasers are keeping up their demands. Demands for the principal raw materials produced in the Twelfth Federal Reserve District, of which San Francisco is the center, continued greater or in excess of supply in every case except agricultural products.

Real estate is active and the continued warm spring weather has brought an increase in building. Development in the rural districts is also being made, due to favorable weather conditions in the first part of March. The continued dry spell, which extended through March, has been hard on farmers who are in need of rain, as many sections are suffering from the lack of the usual amount of moisture.

Equipment companies have large orders on their books and railroads are making good showings, the recent rate reductions on west-bound freight aiding them in their efforts to secure more cars for California's eastward shipments.

Credit demands upon the Twelfth District Federal Reserve Bank and its branches reflected, to a limited extent, the increasing volume of production and trade. Commercial loans on March 7 of 66 reporting banks in the district show an increase of \$20,000,000 over the same date of the previous month. The Federal Reserve Bank recently advanced its discount rate from 4 to 4½ per cent.

Portland

Business conditions generally continue to hold up well. Despite unfavorable weather during the first two months of this year the building permits and electrical permits showed a healthy gain over 1922. During the most of March the weather has favored construction and it is expected that March records will show a further gain.

The lumber business is in a very strong position. Mills are selling their output without effort and are maintaining prices. Several large bond issues have been successfully floated by lumber companies, indicating confidence in their future. Lumber production continues 15 to 20 per cent above normal with good strong demand for all grades. New business has been 7 per cent above production and shipments 7 per cent above new business. Ready built houses are more in demand than ever.

Electrical jobbers report shortage in some of the important lines—notably conduit. Orders for copper wire have been unusually heavy due to rising prices. The volume of business continues good.

Power companies through the state have started on another busy year of expansion with every company undertaking important developments.

Salt Lake City

One of the best indications of the return of better business conditions in the intermountain section is the manner in which the mining industry is thriving. The local settlement price of lead is the highest since the peak prices which prevailed during the world war. The price of copper is the highest for local settlement since the break in price during 1920.

Practically all of the metal mines in this section have announced a general wage increase for all mine and mill employees of from 7½ cents to 15 cents per day, with a maximum of 50 cents per day. The increase became effective March 16, and is a result of the increase in the prices of metals.

Electrical dealers devoted a great deal of intensive advertising and sales work to the sale of washing machines during the month of March, with considerable success.

With the opening of spring, building activity is expected to be greater than for many years past.

Merchants in some lines report present business not as good as it should be, but are looking forward to a much better year than last. The general trend is decidedly encouraging.

Los Angeles

Building activities in Los Angeles took a decided spurt during the first half of March and at the present rate the total for the month will run considerably in excess of \$15,000,000. For approximately the first half of the month the city building department issued 2,372 permits with an estimated valuation of \$9,924,547 while for the corresponding period of the previous month the number of permits issued was 1,802 and the estimated valuation \$5,135,136. This month will be a record month, breaking all construction records in the city's history. Up to March 20 approximately \$37,000,000 was invested in new construction since the beginning of the year.

Income tax receipts at the local office from January 1 to March 15, inclusive, were \$7,795,632.42 this year, as against \$4,589,518.65 during the same period of 1922. This shows a gain for the first three months of this year of \$3,206,115, compared with the gain in the entire nation of approximately \$7,000,000. For the returns filed March 15 of this year the tax paid by the people in the Los Angeles district will total approximately \$10,000,000, according to the Collector of Internal Revenue.

The local retail trade which experienced a slight slump during the last few days of February and the first few days of March seems to be back to normal, as retailers of electrical goods

report very favorable conditions for this season of the year.

Electrical supplies and lamps continue to be big sellers, this no doubt being due to the tremendous building activity that is in progress both in Los Angeles and southern California.

Denver

Although Colorado missed the severe storms which swept the middle west early in March, several near blizzards followed in such extreme fashion that considerable damage resulted to transmission lines of nearly all public service companies in the state. Traffic was materially delayed but railroads report that total tonnage and car loadings for March were the highest in almost a year.

Weather conditions have, of course, delayed outside construction but the building program as a whole has not slumped yet although marked wage increases for building craftsmen effective this month is an added factor of discouragement in the construction of many small homes. With recent advances on copper and steel, prices on electrical work are climbing but not in the degree warranted owing to competitive conditions between contractors.

Old-time optimism is not found in the banks although those in the larger cities all show greater deposits. Loans are being made conservatively. Collections in some lines are fair but on the whole are considered slow. Post office receipts show a 15 per cent increase over the same period in 1922.

Seattle

Marked improvement in the Seattle retail trade was apparent during the last two weeks, and it is believed this indicates a good volume of business during the spring and summer. February, although a short month, and visited with stormy weather, made an excellent showing in retail trade, and March sales volume is expected to run 15 per cent in advance of March of last year. Requests for credit have been granted in larger volume during the last week than for some time. This is interpreted to show a better purchasing position of the public, and a renewed confidence in price stability. Collections are showing gradual improvement, although not entirely satisfactory as yet.

Building of all kinds took a decided leap in February over that of January, particularly in the matter of residence and apartment construction. Contractors and builders in Seattle predict that the greatest increase in building, however, during the year will be in business, industrial and public buildings, as the need for the first two classes of construction is pressing.

Lumber production is well above normal, and new business is pouring into Northwest mills. Many dealers and manufacturers report sales approximate closely their productive capacity.

The annual car shortage is again forecast, and efforts are being made by the State Department of Public Works to forestall this menace. Eastern railroads are not returning empty cars to the western lines, and unless this can be remedied immediately, a serious shortage may occur in the Northwest.

Construction News

Bridges

Calif., Martinez—The board of supervisors has given notice of intention to grant a franchise to the Delta Bridge Corporation for the construction of a steel drawbridge across the San Joaquin River, 3 miles east of Antioch. The proposed bridge will be 3,675 ft. in length and will be erected at a cost of \$600,000.

Ore., Portland—A contract was recently signed by the county commissioners retaining Robert E. Kremers of Portland and Ira G. Hedrick of Kansas City as engineers for the Ross Island and Burnside bridges. Bonds totaling \$4,600,000 were voted at the November election to cover the cost of both bridges. The Burnside bridge bonds were set at \$3,000,000 and the Ross Island bridge bond issue at \$1,600,000. The engineers' fee will not exceed \$180,000 for which they agree to furnish all engineering work including preliminary surveys, war department plans, inspections at the mills and at the sites and the supervision of all borings and soundings. Mr. Kremers was until recently chief of the Bureau of Construction and assistant to the city engineer. The Portland Chamber of Commerce and various civic bodies and organizations are insisting that a very thorough study be made of the entire bridge problem so as to obtain bridges having a maximum usefulness to the city. It has also been urged that competent architectural advice be obtained to insure that the proper attention be paid to the artistic side of the problem. It is not expected that actual construction contracts will be awarded before next January.

Utah, Salt Lake City—Kroft & Bundy were awarded contract recently for a bridge on the Salt Lake-Zion national park highway over Coal Creek, within the city limits of Cedar City. Nine bids were received, the lowest being \$26,589.94.

Wash., Seattle—Col. E. L. Schulz, chief of the U. S. Engineers, has approved preliminary plans submitted by County Engineer T. R. Beeman for a proposed bridge to span the Narrows of Lake Washington, and final plans will be forwarded to Washington immediately for approval. The structure will have a 40-ft. clearance, and will cost approximately \$30,000.

Dams

Calif., Oroville—The Oroville-Wyandotte Irrigation District has issued a call for bids for the construction of a dam on Lost Creek. Bids are to be opened on April 13. Plans for the dam were prepared by S. J. Norris of Oroville. The dam is to be completed by Dec. 1.

Highways

Calif., Santa Barbara—A. B. Cook, Santa Barbara, was awarded contract by county supervisors at \$27,000 for paving approximately two miles of San Marcos pass road with oiled macad. Chas. T. Richardson bid \$32,000. Owen H. O'Neill, county surveyor.

Colo., Denver—Two contracts for state highway work totalling \$66,000, have been awarded by the highway department. The first contract is for a gravel surfacing project on the Santa Fe trail, between Lamar and the Prowers county line. It is 7 miles in length and the contract was awarded to the Standard Engineering and Construction company of Denver, for \$42,000.

Ore., Oregon City—The State Highway Commission has awarded the road contract for the section of the Pacific Highway between Fifth

street in Oregon City and Canemah, approximately .9 mile in length, to Rajotte-Winters, Inc. The total amount of the contract is \$90,000 and the date set for completion is Dec. 31, 1923. Under the terms of the agreement which has just been executed Oregon City, Portland Railway Light and Power Company, Crown Willamette Paper company and the Southern Pacific Company are cooperating in varying amounts.

Ore., Astoria—McClellan & Williams were the lowest bidders on the paving of about 1 mile of the market road between the McGregor ranch and Youngs river falls and the contract will be awarded to them. The paving is to be of 6½-in. concrete and 15 ft. in width. Price, \$20,495.03, contract to be completed by Aug. 15.

Wash., Olympia—Awards have been made for two highway jobs as follows. Grading, draining and paving with concrete about 6.37 miles of the Pacific Highway between Carrolls and Kelso to S. A. Mocerri & Co., Seattle, for \$221,417. Similar work on 4.4 miles of the Pacific Highway between Kalama and Carrolls awarded to F. X. McLellan of Seattle for \$155,865. Specifications call for 6-in., 20 ft. concrete for both jobs.

Wash., Everett—Snohomish County Commissioners have granted a petition of Mukilteo residents for the paving of 2.8 miles of the Mukilteo Road, under the Donahue Road act. County Engineer Ross D. Alverson places the estimated cost at \$75,200 for six-inch concrete paving, 16 ft. wide. Plans for the road will be started at once.

Irrigation Projects

Calif., Sacramento—A contract has been awarded by the State Reclamation Board for construction of approximately 13 miles of levee work in Reclamation District No. 1660, Sutter County, to W. E. Callahan Co. of Texas. The cost will be approximately \$1,000,000.

Calif., Bakersfield—The project to store the waters of Kern River behind an artificial barrier in the mountains near South Fork will proceed without further hindrance according to Herman T. Miller, chairman of the committee of 25 which has presented a petition for the formation of an irrigation district to include 292,100 acres in Kern County. The cost of building the dam in the mountains and the necessary canal system would approximate \$25,000,000, it is said. According to the chairman of the committee of 25 it is probable that an election to determine whether bonds shall be issued for that amount will be called in the near future.

Nev., Fallon—Signing of the agreement whereby the reclamation service leases the Lahontan power plant for ten years to the Canyon Power Company, clears the way for construction of the Spanish Springs reservoir. This was the assertion of John F. Richardson, manager of the Newlands Project in commenting on the signing of the agreement by Secretary of the Interior Fall. "It means the completion of the largest irrigation project in the west, and reclamation of lands for which people on the lower Truckee and the bench lands of the Newlands Project have waited twenty years," Richardson states. Approximately \$200,000 is available for work to be completed or contracted for by July 1st; he has left for Denver to consult with F. F. Weymouth, chief engineer, to plan details for the first work on the Spanish Springs system.

Ore., Portland—The North Canal Company has applied for permission to construct Crane Prairie reservoir for the storage of 160,000 acre-feet of water. The reservoir will be placed in the channel of the west fork of the Deschutes River. The dam is to be of loose rock, with timber facing resting on a hand made rubble masonry wall. The wasteway will be of cyclopean masonry and the outlet will be a concrete lined tunnel 9 ft. square controlled by iron gates operated by lifting devices. The total area submerged will be 7,750 acres. The water will be used for irrigation, power and domestic purposes, with a priority date of Sept. 9, 1921. The total cost of this project is estimated at \$160,000.

Ore., Pendleton—Contracts are expected to be signed between the U. S. Reclamation service, the Western Land and Irrigation company, and the Furnish company for additional water to be taken from the McKay Creek dam soon to be constructed in Umatilla county. F. E. Weymouth, chief engineer of the reclamation service, from Washington, D. C., is now in Hermiston, the irrigation center for Umatilla county, making preliminary arrangements for the construction of the \$2,000,000 storage project on McKay Creek.

Power Plant Equipment

Calif., Venice—Southern California Edison Co. will expend approximately \$408,000 during 1923 for improvements to its system in the Venice district. Of this, \$270,000 will be expended on power lines from the Sierra power plants and \$138,000 for actual work in the Venice territory. The new work will provide for 2500 additional houses, 5 new factories, and an increase of 12,000 in population.

Calif., Santa Barbara—Southern California Edison Co. will expend approximately \$81,000 for extension of its lines in Santa Barbara in 1923. A substation is planned at Carpinteria costing \$60,000, and renewals in this district will amount to \$22,500. A total of \$241,000 has been appropriated for Santa Barbara and vicinity.

Calif., Monrovia—Southern California Edison Co. will expend approximately \$156,000 on improvements to its lines and service in this district. This territory is served by the high Sierras power plants, for which about \$12,000,000 has been appropriated.

Calif., Fullerton—Southern California Edison Co. has appropriated about \$300,000 to be expended on improvements and betterments in the Fullerton, La Habra, Brea, Placentia and Yorba Linda district.

Calif., Los Angeles—G. H. Kuhrt, General Manager of the Los Angeles Railway Company stated that a new power substation will be built at 54th & 2nd Ave. Station and equipment will cost \$125,000.

Power Projects

Calif., San Bernardino—San Geronimo Power Co. has secured a loan of \$450,000 for the construction of two hydroelectric plants north of Banning and Beaumont. About \$18,000 will be expended on new roads into the territory. R. R. Scarborough is president, and M. T. McAllister, secretary.

Calif., Modesto—Bids will be received April 9 on \$298,400 Modesto Irrigation district bonds for construction of transmission lines from Don Pedro dam to the Modesto district.

Wash., Okanogan—The Washington Water Power Company will immediately put crews in the field to start the extension of the 60,000-volt transmission line from Okanogan to Withrow.

Railways

Calif., Los Angeles—Los Angeles Railway Corp., 11th and Broadway, is preparing plans for an automatic power station to be erected at 54th Street and 2nd Ave. The building will

be 46 x 40 ft., brick construction with plaster exterior, structural steel, concrete roof. Ice-box doors will be used to eliminate noise. There will be no windows. Bids will be taken in about 30 days. Plans have been completed for a brick administration building to be erected by contract at 7th and Central. It will be 1-story, 28 x 280 ft., brick construction composition roof, cement floors, steel sash, wire glass. Bids will be taken in about a month.

Calif., Kelso—W. A. Bechtel, San Francisco, has been awarded general contract by Union Pacific Railway, at \$17,500 for construction of a pre-cast unit type reinforced concrete round-house, 10 ft. long, at Kelso, San Bernardino county. It will contain five stalls. Other construction work at Kelso totals approximately \$100,000.

Calif., Bakersfield—A. T. & S. F. Ry. will expend about \$5,000,000 eventually on terminal facilities for Bakersfield. Immediate plans involve the construction of a building to house about 20 engines, and a storehouse for heavy material. It is proposed to double track the road from Bakersfield to Kern Junction. J. W. Walker is superintendent of the Valley division.

Calif., Bakersfield—Southern Pacific Railway has applied to the interstate commerce commission for permission to construct a branch line railroad between Magunden and Arvin, Kern County. It will be 19 miles long and will serve the Weed-Arvin district.

Ore., Portland—Hawthorne Avenue from Grand Ave. to East 11th street is to have new rails laid for heavy trolley traffic, and to prepare the way for the new roadbed temporary tracks have been laid on each side of the avenue to take care of the present car traffic construction crews. Vice-president Fuller of the Portland Railway Light and Power Company states that the new rail construction will cost about \$40,000 and the rails used will be the heaviest used of any trolley car rail in the city, 122 lb. to the yard. The actual construction work will be completed in 30 days, but a city ordinance provides that the cement work used under the track must be left for 30 days to harden. Thus the new tracks will not be used for two months.

Wash., Spokane—The Great Northern Railway, at an expense of \$543,262, has begun relaying its tracks between Wilson Creek and Quincy, a distance of 35 miles, with 100-lb. rails. According to F. S. Elliott, western superintendent, the company will spend in the Spokane Division this spring, more than \$1,000,000; the automatic block signal system between Fort George Wright and Wenatchee will cost \$400,000, and \$60,000 will be spend in rebuilding telephone lines.

Wyo., Casper—A \$12,000,000-dollar contract for the construction of 330 miles of railroad from this city to Miles City, Mont., via Sheridan, Wyo., has been let to the firm of Peterson, Shirley, and Gunther with headquarters at Omaha. Involved in the contract is the building of a telegraph system and fencing for the entire distance.

Street Lighting

Calif., Los Angeles—Osborn Electric Co., Turlock, submitted low bid to board of public works, at \$7,230 for constructing ornamental lighting system in Seventh Street between Pacific Avenue, and Gaffey Street.

Calif., Los Angeles—C. W. Sparks, 433 San Fernando Building, Los Angeles, submitted low bid to board of public works, at \$7,295 for constructing ornamental lighting system in Sixth Street between Pacific Avenue and Gaffey Street San Pedro.

Colo., Calhan—The installation of a municipal lighting system will be made if the recently introduced city ordinance is approved at the election May 3. Action will also be taken on a waterworks system, if the bonds are authorized.

Streets and Sewers

Calif., Napa—R. E. Errington has been awarded contract by the city council for the paving of Third Street from School to Jefferson, a distance of four blocks, price \$21,051.

Calif., San Bernardino—J. F. Knapp of Turlock, (Box 442, Long Beach) was awarded contract by county supervisors at \$109,600 for improving Hellman Avenue, approximately one mile, by grading and paving with 5-in. concrete pavement; constructing curbs, walks, and retaining walls.

Ore., Portland—City Engineer Laurgaard has been directed by the council to prepare plans and specifications for the improvement of Caples street from its southerly end to Broadway drive; Wygant street from East 7th Street to East 11th Street; East 46th SE from 60th Avenue SE to 48th Avenue SE; East 27th Street from Siskiyou to Klickitat Street; and for a sewer in East 27th Street from Siskiyou to Klickitat Street.

Ore., Portland—A. D. Kern was the lowest bidder for the paving of Flanders street from First to Twelfth streets, his price being \$54,471 for asphaltic concrete. The Jacobsen-Jensen company submitted the lowest bid, amounting to \$14,189.80, for the construction of the Forty-second Street Southeast and the Seventy-second Avenue Southeast sewer system.

Utah, Ogden—William E. Roche has been awarded contracts for \$142,898.83 worth of sewer work in the Third ward by the board of city commissioners. The contracts call for cement-concrete pipe in districts 148 and 149, on which Roche was the lowest bidder. The bid on district 148, which extends from Sixth Street to Second Street, between the east and west lines of the city, was \$68,663.05; that on district 149, extending from Sixth Street to Twelfth Street, was \$74,235.78.

Wash., Seattle—City Engineering Department has completed plans and is calling for bids for the Beach Hill Improvement project, which completed will cost \$1,500,000. The work will be awarded in two separate projects: the first to include sluicing of 1,496,000 cu. yd. of earth from the hill to the 9th Avenue South district; the second the paving of 23,050 sq. yd. of 8th Avenue South with 8-in. concrete.

Wash., Seattle—Two important projects to be undertaken in Seattle during the summer include the paving of Jackson Street, et al., at an estimated cost of \$543,261; and paving of Wilson Avenue, et al., at an estimated cost of \$253,353.

Waterworks

Calif., Chico—At a special meeting of the city trustees it was decided to again place the water bond proposition before the voters at an election to be held in April.

Calif., Santa Barbara—The \$850,000 bond issue for a water supply and distributing system for Montecito county water district carried at the special election March 1. The proposed plan is to construct a tunnel through Toro Canyon at a cost of \$350,000 to secure a seepage flow sufficient for present needs, and to build a distributing system costing \$500,000. Cook, Wyant & Moore, consulting engineers, prepared the preliminary report for the district.

Idaho, Lewiston—The municipal water system is to be improved and extended by the Burns & McDonald Engineering company of Kansas City, Mo., and will cost \$380,000. Two reservoirs will be installed. The improvement will also include a filtration plant. All wooden pipe will be replaced by cast iron.

Miscellaneous

Calif., Eureka—The Sugar Loaf Peak tunnel of the Electro-Metals Company at Ishi Pishi Falls of the Klamath River in Siskiyou county, near Sommer Bar, is practically completed. The

tunnel will, after the construction of the dam, be used as a penstock for a power plant to develop 110,000 hp. A standard gage railway will be built, it is expected, over the 50 miles from Trinidad to the site of the power plant. The plant will manufacture products of iron, copper, zinc, and other metals, the ore and supplies coming by sea.

Colo., Denver—An entirely new fire alarm system with headquarters in a three-story central fire station to be built at Twelfth and Curtis Streets, the total cost of which is estimated at \$200,000, is planned for submission to the voters at the coming city election asking authority for the issuance of bonds to finance the improvements.

Wash., Seattle—The Inter-County Rivers Commission of King and Pierce Counties plans the expenditure of approximately \$120,000 in control work along the Stuck and White Rivers. King County will pay \$72,000.

Wash., Wenatchee—The Farmers' Telephone & Telegraph Company will make extensions, repairs and improvements costing from \$30,000 to \$40,000.

Buildings (Industrial)

Calif., Los Angeles—Los Angeles Gas & Electric Corp., 645 So. Hill Street, will erect a 1-story storage building for itself at S. E. corner 48th and Staunton Avenue. Dimensions, 313 x 90 ft., steel frame construction, corrugated iron exterior and roofing, cement floors; \$60,000.

Calif., Los Angeles—Hamm & Grant, Inc., industrial engineers, Ferguson Building, have been commissioned to prepare plans and will erect a worsted and woolen mill on Central Avenue near Ballona Avenue for the Pioneer-Pacific Worsted Co., Lemuel J. Coburn, president. The first unit will cover an area of 125,000 sq. ft. and will be 1-story, steel frame construction, brick and hollow tile walls, steel sash, wire glass, saw tooth roof, probably factory maple floors; \$250,000.

Calif., San Jose—Work is to be started within a few weeks on a \$2,500,000 cement manufacturing plant, to be the largest of its kind in the country, which will be built by the Guadalupe Lime & Cement Co. on the Almaden Road about ten miles southwest of this city, it was announced recently.

Calif., Compton—W. H. Edwards will erect a \$30,000 ice plant on Terebinth Street, opposite the Samson Tire Factory.

Mont., Shelby—The Red Cliff Brick Company of Medicine Hat, Alberta, is planning to locate a plant in Shelby costing \$60,000.

Wash., Aberdeen—A \$50,000 veneer plant is to be built on the site of the Panama and Eastern Mill on the Hoquiam River, as announced by A. A. Bator, of Aberdeen, A. G. Basil and A. J. DeLateur of Raymond, and L. P. Cole of Olympia. The plant will be known as the Grays Harbor Veneer Company. Construction of the new plant will start at once.

Wash., Spokane—The American Smelter & Refining Company will spend \$200,000 in increasing the capacity of its smelter in East Helena. Increased ore receipts due to a contract with the Hercules and Tamarack & Custer mines in the Coeur d'Alenes makes this enlargement necessary.

Wash., Tacoma—A new factory costing \$75,000, to employ 300, is planned for Tacoma by the Rice-Greisen Company of San Francisco, according to officials visiting in Tacoma, inspecting sites.

Wash., Chelan—Construction work will begin soon on a \$375,000 cold storage and ice manufacturing plant. The cold storage plant will be capable of storing 300,000 boxes of apples and the ice plant manufacturing 50 tons daily, with a storage capacity of 4,000 tons. The plant is to be built by R. H. Moorhead of Chelan.

Buildings (Miscellaneous)

Calif., Woodland—School—Goold & Johns, of Stockton, have been awarded the contract for construction of the Esparto Union High School on their bid of \$86,387.

Calif., Los Angeles—School—Pozzo Construction Co., 421 Macy Street, was low bidder at \$111,110 on the general contract of erecting a new building at Laurel school site. Thos. Franklin Power, 307 Tajo Building, architect.

Calif., Los Angeles—Theater—Architect G. Albert Lansburgh, Los Angeles and San Francisco, Calif., has completed plans for a 3-story theater building to be erected on west side of Highland Avenue, north of the Hollywood Hotel, for a group of local capitalists and theatrical men who have organized a stock company. John M. Bowen, Van Nuys Building, attorney, represents the new corporation, the personnel of which is withheld. The structure will contain an auditorium seating 1,500, with offices for the company, etc. The building will be of Spanish type with reinforced concrete exterior walls, tile roof. Estimated cost, \$750,000.

Calif., Santa Barbara—Theater—E. L. Mayberry, 472 Pacific Electric Building, has been commissioned to prepare engineering plans for the new Lobero theater to be erected at Santa Barbara for a syndicate of Santa Barbara and Montecito men. It will cost \$125,000. It will be reinforced concrete and tile construction and will be built by Geo. W. Smith, Santa Barbara, architect.

Calif., Los Angeles—School—The architectural department of the board of education, Edgar H. Cline, architect, has completed plans for the new Wilshire junior high school buildings to be erected on McCadden Place, between Wilshire Blvd. and Sixth Street. There will be two buildings, each 2-story, 120 x 350 ft. and 64 x 145 ft. respectively. Brick construction, tile and composition roofing; \$350,000. The board of education will advertise for bids shortly.

Calif., Los Angeles—W. F. Riley, 3706 Whittier Blvd., has the contract at about \$115,000 for the erection of a 3-story, class C apartment building at 475 South Bixel Street for F. W. Babcock; will contain 51 rooms, divided into single apartments. Brick, 3-story and basement, 97 x 100 ft., pressed brick facing, composition roofing, tile baths and drainboards, O. P. and hardwood floors, gas radiator heating, automatic unit storage water heater, wall beds, automatic electric passenger elevator, garbage incinerator, ornamental iron, maple floor in hall room, staff work. Plans by Architect Edward Cray Taylor, and Ellis Wing Taylor, engineer, 713 West 8th Street.

Calif., Oakland—Offices—Contracts have been signed for the erection of a 3-story reinforced concrete building on the east side of Franklin Street, just north of Fifteenth. The investment will be \$125,000.

Calif., San Francisco—Apartments—Tentative plans for a 12-story apartment building, to cost approximately \$2,000,000, have been announced by John C. Shipp, president of the Sierra Securities, Inc., and associates, to be erected on the southeast corner of California and Mason Sts., running through to Pine St. B. G. McDougall is the architect. The property was recently purchased from the University of California and possession will be had about July 1. Permission has been granted by the city engineer to tunnel under California Street to connect the apartments with the Fairmont Hotel. Under the apartments it is planned to have three stories below the California Street level, to be used as a garage. Plans for financing are well under way, according to Mr. Shipp, and may take the form of a bond issue.

Calif., Sawtelle—Institution—Los Angeles Building & Contracting Co., Marsh-Strong Building, has been awarded the contract at \$190,444 for all work complete for erecting an administration and hospital building at Soldiers'

Home, Sawtelle. The building is to be completed by June 30.

Calif., Sacramento—Hotel—Within the next 90 days work will be started on a ten-story, 400-room hotel here. The investment will total about \$2,000,000. The building will be financed by a group of San Francisco and Sacramento men, headed by E. Tripp and W. C. Crittenden, of San Francisco. The structure will occupy the corner of 12th and L Streets, with a frontage of 200 ft. on L Street.

Calif., Long Beach—Apartments—F. H. Butterfield, 464 Cerritos Street, Long Beach, has had plans prepared and will erect a 144-room apartment building at 323 W. Fourth Street, Long Beach, for himself; \$150,000.

Calif., Los Angeles—Offices—Architects Morgan, Walls & Morgan, 1124 Van Nuys Building, have completed plans and are taking bids for erecting a 5-story, class A building on East First Street, near Alameda Street, for the Los Angeles Soap Co. It will be a combination office and warehouse building, 60 x 270 ft., reinforced concrete construction, steel sash, steel rolling doors, elevators, etc.

Calif., Los Angeles—Offices—C. J. Kubach Co., 701 Merchants National Bank Building, was low bidder on the general contract at \$1,370,000 for erecting the new Chamber of Commerce Building on 12th Street, extending from Hill Street to Broadway; John C. Austin, 1125 Baker-Detwiler Building, and John Parkinson, 420 Title Insurance Building, associated architects. The Kubach Co. also submitted a general bid including all work completed, except elevators, at \$2,169,000.

Calif., Pasadena—School—Architects Allison & Allison, 1405 Hibernian Building, are preparing plans for the George Washington school on Monk Hill, Pasadena. There will be an auditorium, study hall, class rooms, cafeteria and manual training department, brick construction; \$200,000.

Colo., Denver—On the opening of bids for the state university medical school and hospital to be built here, that of Alex Simpson, Jr., was the lowest and amounted to \$983,730 for the general construction work while the Denver Electrical Co. was low on electrical work with a bid of \$59,500.

Colo., Denver—A recreation building to include a gymnasium, swimming pool, and recreation rooms for the Knights of Columbus, will be started shortly on the property adjoining the present club house at Sixteenth and Grant Streets, at a cost of over \$100,000, according to J. Leo Stack, head of the local organization.

Ore., Portland—Apartments—Two new apartment houses are to be erected in the city immediately, planned by Claussen & Claussen. A 4-story building will be erected on the 80 x 100-ft. site adjoining the Cordova Hotel on Eleventh Street for Elizabeth M. Newton, and will cost \$105,000. There will be 34 apartments of 2, 3 and 4 rooms. The plans call for a reinforced concrete structure with a faced brick front. The second apartment house is being erected by Frank Cunningham, as planned by the same architects as above, and will occupy a 100 x 100-ft. tract and will contain 20 apartments. The location is Fremont and Michigan Streets and the cost will be \$50,000.

Ore., Portland—School—Houghtaling & Dougan, architects, have prepared plans for the new Washington High School building to replace the one recently destroyed by fire. The plans call for a three-story and ground floor, reinforced concrete building, 160 x 180 ft., costing in the neighborhood of \$450,000.

Ore., Portland—Apartments—Thomas & Thomas will erect two apartment houses on the north side of Hawthorne Avenue between East 18th and 19th Streets, for the Lawrence-Moore Company. They will each be 85 x 85 ft., two stories and basement, of hollow tile with brick veneer, costing \$75,000 each.

Ore., Portland—Stores—Offices—A four-story structure with a frontage of 75 ft. on Alder Street and extending back 130 ft., is to be erected at a cost of \$150,000. Plans are being prepared by Houghtaling & Dougan. A sprinkler system will be installed and the interior trim will be mahogany with tile corridors. M. Ungar, owner.

Ore., Astoria—Theater—The Black Cat, Inc., a \$60,000 concern, has announced that it will erect a modern theater costing \$100,000 in Astoria this spring or summer.

Ore., Portland—Terminal—A new two-story terminal building covering half a block on the south side of Salmon Street between 5th and 6th is to be erected as announced by J. H. Ainscough, president of the States Auto Truck Company. The outlay will be about \$250,000. In addition to a commodious stage station with driveway there will be a large number of stores for retail establishments. There will also be a full basement. The structure is to be ready for use in six months. Houghtaling & Dougan are the architects.

Ore., Portland—Lodge—The general contract on the Al Azar temple has been awarded to the William Freeburg Construction Company. The building will be 100 x 100 ft., two stories and basement.

Wash., Vancouver—Institution—The Pythian Home for Oregon and Washington has issued a call for bids. The unit to be erected now is to be the administration unit, containing the administrative offices, auditorium, dining room, hospital and 35 guest rooms. Fireproof, 3 stories and basement, costing about \$150,000.

Wash., Wenatchee—Bank—The First National Bank plans to immediately demolish present structure and erect a two-story building, 85 x 45 ft. in size, costing \$100,000. Plans under way by Albert Held, Spokane.

Wash., Sedro Wooley—School—Union High District No. 4 has accepted plans of Stephen, Stephen & Brust, architects, Seattle, for the proposed Union High School, to cost \$125,000. Structure will have capacity of 700 pupils, with auditorium seating 1,000 persons.

Wash., Sunnyside—School—The King County School District has commissioned F. A. Naramore, architect, Central Building, to prepare plans for a union high school, to be two-story and basement, of brick, costing between \$70,000 and \$80,000.

Wash., Seattle—Offices—James Campbell of the Campbell Lumber Company plans the erection of an eight-story office structure costing \$250,000, as an annex to the Central Building. Only two stories of the building may be erected at this time, at a cost of \$85,000, but the owner may proceed with the entire structure.

Wash., Seattle—Offices—W. H. Britt plans the erection at E. 52nd and University Way, of a business and office building, three stories high, costing \$100,000. J. R. Nevins, architect.

Wash., Seattle—Apartments—H. Riernersten, 5903 Fremont Avenue, plans the erection at 4910 Brooklyn Avenue of a 3-story apartment building, 80 x 103 ft., containing thirty-three apartments, and costing \$80,000. John A. Creutzer, architect.

Wash., Tacoma—School—The Tacoma school board has decided to present to the people of the city at the May election a bond issue of approximately \$2,400,000 to provide additional school facilities, including a number of new buildings.

Wash., Seattle—Apartments—Plans for a 3-story modern apartment building to cost approximately \$75,000 and to be erected at the southeast corner of Terry Avenue and Jefferson Street, are being prepared by Architect J. A. Creutzer, Leary Building. The building will be the property of John Hopkins. It will be finished with terra cotta and will occupy a ground area of 120 by 52 ft. It will contain thirty-two apartments.

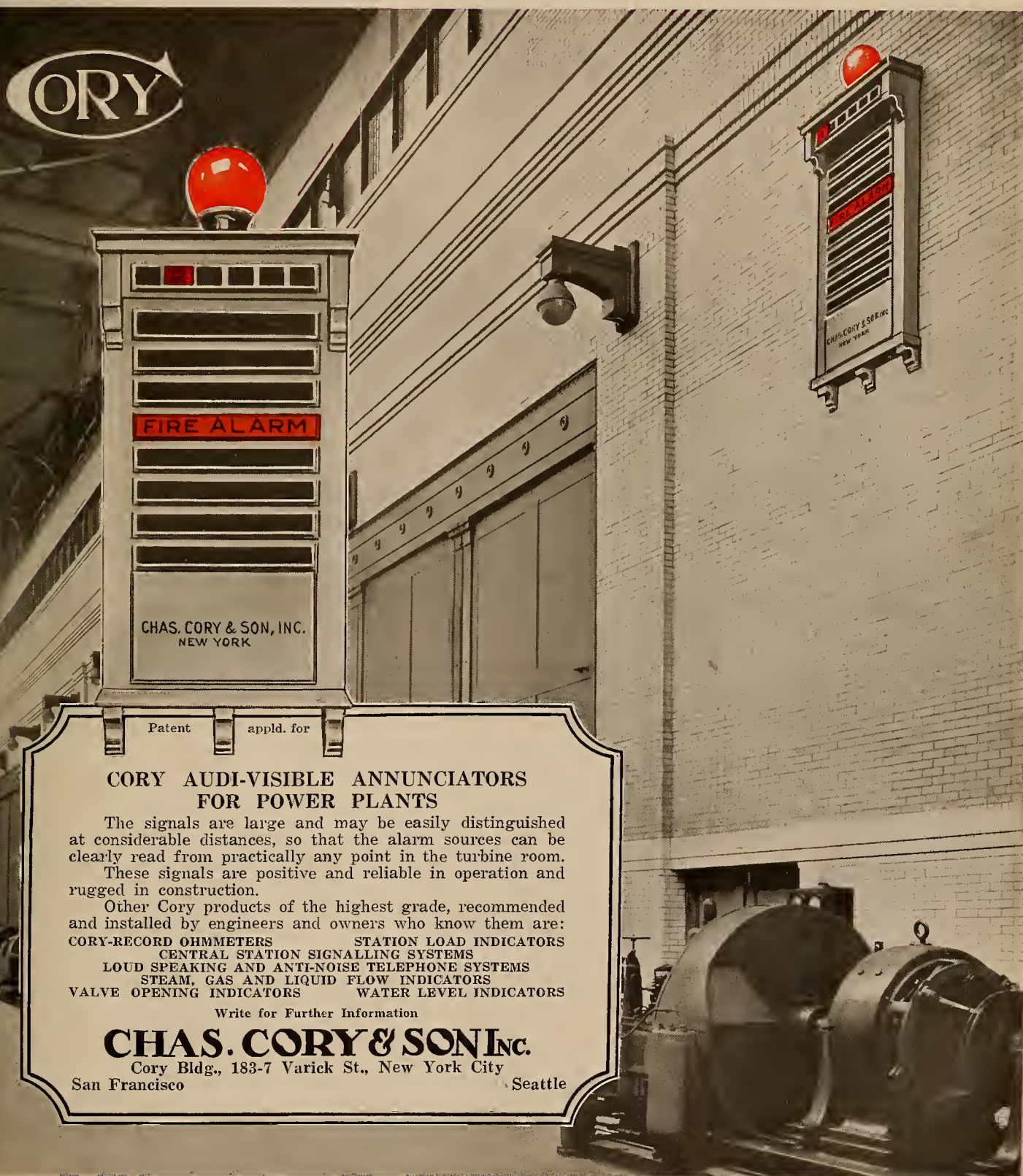
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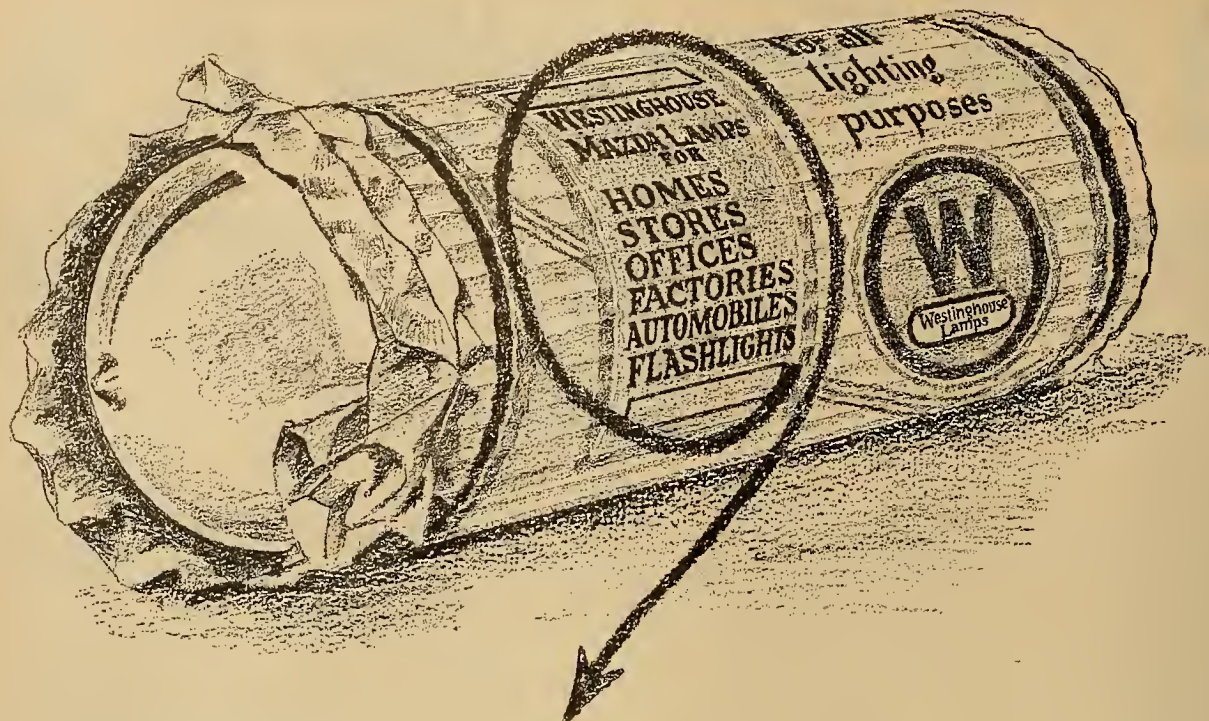
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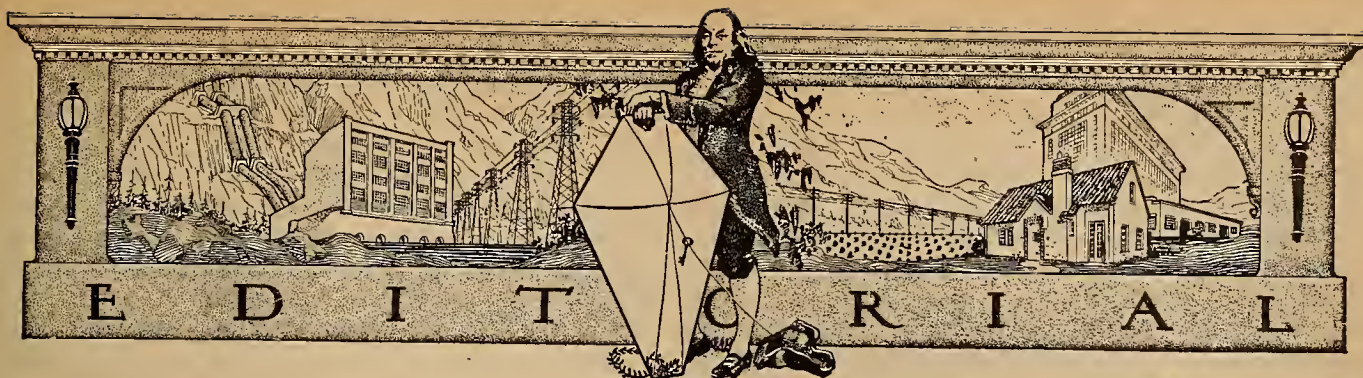
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For Sale—A Service

THE success or failure of the various electrical cooperative movements of the West depends primarily upon adequate financing. In order to carry on their activities these organizations must be provided with funds by the electrical industry in the states where they operate and by the national electrical manufacturers whose products are most benefited by the story which the organizations tell to the public. The question has been raised as to why the cooperative campaigns or leagues should be financed at all. The answer is simple: Because they render a service to the electrical industry as its educational institution that the industry or any one of its constituent branches cannot render to itself.

A FINANCIAL contribution to one of these organizations by either a company or an individual is directly chargeable to one of two accounts,—new business or advertising. Consider for a moment the amount of advertising which could be purchased for the sum which the companies as individuals have been asked to contribute. It might buy a hundred column inches in a local newspaper to be used in a week and forgotten by the public in less time than that. Charged to new business, it might pay the expenses of one salesman on a "trip" from San Francisco to Los Angeles on the trail of a "hot" prospect.

FOR purposes of comparison, review a few of the activities of the California Electrical Cooperative Campaign and then determine whether that same service could have been purchased by individual company effort at the same price which the Campaign is asking in the form of individual contributions. In the State of California there is no electrical company with its commercial aspect, that could be given entrée into the schools of any one locality. The

California Electrical Cooperative Campaign, being an educational institution only, with no commercial aspects, has recently exhibited electrical production and utilization films to 21,997 pupils with their teachers in the public schools of one of California's leading cities.

LAST year the Campaign told the electrical story by means of motion pictures and projected slides in the theaters of California to 561,000 people at a total cost to the entire electrical industry of \$109, or less than 18 cents per thousand. Is there any scheme of advertising that has ever been evolved by any one contributing company that has given such an advertising value at so low a rate? Year before last the Campaign gave the industry \$30,000 of newspaper space in the form of publicity at a cost to the industry of less than \$3,400, a record which no individual company can approach.

THIS year, in the exhibition of ten electrical homes, the story of utilization of current consuming devices will be told by the personal contact method to 250,000 people in California. What would an individual company pay if it could, by word of mouth, tell its story to 250,000 interested and attentive people?

THESE are but a few of the past achievements and future plans of one of the western cooperative organizations. Service of this character is being rendered in other sections of the West by the Electric Service League of British Columbia, the Denver Electrical Cooperative League, the Electric Club of Seattle, and the Rocky Mountain Electrical Cooperative League. As necessary and valuable educational institutions, they deserve the confidence and the moral and financial support of the entire electrical industry. Each has a service to sell with no self-evident securities but with definite assurances. What is this service worth to you?

Destructive Competition vs. Sound Regulation

PRESENT-DAY enlightenment has shown that many of our time-honored business axioms should be taken with a grain of salt. Among them may be mentioned the mossgrown saying that "Competition is the life of trade."

The truth, or untruth, of this saying depends entirely upon the kind of competition. Fundamentally, there are but two kinds of competition, price and service; this may be expressed even more clearly as destructive and constructive.

At intervals, politicians, office seekers and self-styled economists mount blithely upon their soap boxes and shed bitter tears in lament for the passing of the "good" old times of free-for-all price competition that left a trail marked by the wrecks of many worthy enterprises.

The evolution of the public utility is a striking example of the progress of human intelligence. So short a time as twenty years ago we had with us the political boss with the itching palm, price wars between rival groups with the costly and useless duplication of service, the frantic rush for franchises, the graft of the walking delegate, and all the other evils that dissipated capital and made a joke of the word, "service."

Now, under the guise of "home rule," so-called, an attempt is being made to destroy the fine accomplishments of private ownership under commission regulation. The professional politician would place within counties, even municipalities, the power to regulate the conduct of all public utilities. Thus, instead of a state commission, there would be as many commissions as counties, a plan so absurd, when the nature of the service rendered is considered, as to make it difficult to understand how it could possibly receive serious consideration by intelligent people. Nevertheless, such a plan has been proposed and voted down in Oregon, is now being agitated in Colorado, and may even become a live issue in the next California elections.

A Wise Dealer Recognizes the Value of the Installment Plan

SUNDRY and various learned economists and other gentry given to horn-rimmed spectacles and profound theories have decried bitterly what is known as the "installment plan" of purchasing whatever one wants. It has been claimed that the installment idea makes it entirely too easy to buy, that it promotes ill-advised purchases beyond the means of the buyer, that it encourages the purchase of luxuries and that it works against that type of thrift of which a savings bank account is the exemplar.

Nevertheless, the dollar-down and a dollar-a-month idea has grown and grown so that the economic soundness of the principle is no longer open to question. Nowadays practically every human need with the single exception of food can be satisfied

with payments in small installments and at regular intervals by individuals who have steady jobs and bear good repute in the community.

The homeopathic installment is a pill much easier to take than the bitter allopathic dose of a sizable sum in one lump for the more expensive electrical appliances such as the washing machine or the range. The dealer who is shrewd enough to finance the large floating capital investment required by the installment plan of sales, and who is gifted with a discerning credit sense, or who, failing in these qualities himself, is clever enough to attach himself to a financial organization that can supply these deficiencies, is on the high road to success, while his happy customers will experience a degree of domestic freedom and home comfort impossible of achievement by other means.

Consumer-Ownership, Private Initiative and Public Regulation Spell Service

ONE of the most significant high lights in the report of the Pacific Gas & Electric Company for the first two months of 1923 lies in the following statement by A. F. Hockenbeamer, vice-president:

"Lower electric rate schedules were put into effect Feb. 20, 1923. These rates, in contradistinction to practically all other commodities and services, are substantially below pre-war levels and are probably the lowest in the country, considering the extent of the territory and the widespread distribution effected through a network of more than 11,000 miles of transmission and distribution lines, reaching into hundreds of cities, towns and hamlets, and serving thousands of customers in purely farming sections."

Obviously, as Mr. Hockenbeamer points out, "Such low rates have only been made possible through the enterprise of the company in developing new sources of hydroelectric energy and in building up an enlarged volume of business through intelligent and energetic sales efforts."

Thus, the consumer-ownership idea, in combination with the initiative of private ownership under close public regulation already has accomplished the utmost that the most frenzied advocates of public ownership promised so freely before the California elections last fall. What kind of bait will the public-ownership advocates use next?

Electrified Apartments Growing in Popularity on Pacific Coast

THE completely electrified home has been the subject of discussion in electrical circles for several years. The electrification of the apartment house has not received as much attention, yet builders of apartment houses have shown a tendency to adopt the latest electrical ideas. In several western cities by far the majority of new apartments being erected embody at least one, and in some cases all, of the latest electrical improvements.

Mr. Doerr's article in this issue will prove interesting reading, both to the electrical man and to the consumer contemplating electrifying his home. The cost data are especially illuminating. The figures quoted for typical apartment houses indicate that the cost of operating range and water heater, electric air heaters, and lights is economical, averaging less than twelve dollars per month in one instance noted for a four-room apartment, during the six winter months.

The convenience of the electric range makes a special appeal to the apartment house dweller. In fact, the apartment house has done much to popularize electric cookery, since it is quite often the first establishment of the newly-married, thus paving the way for a complete electrical installation when the new home is built. Several cases are also of record where people once skeptical of the efficiency of electrical ranges, became converted upon occupying an apartment where no other method of cooking was available. The electrical apartment has proved itself a valuable educator.

An interesting fact, not noted in the article by Mr. Doerr, is that twenty-three of the twenty-eight apartment houses listed have electric air heating in some form. Electric house heating has been condemned and derided as being impractical, wasteful and unsatisfactory—principally by people who have never used it. The editors of the Journal of Electricity and Western Industry have been criticized in the past for intimating that electric air heating was practical. This may be excusable because they enjoy it in their own homes.

In certain parts of the West where winter temperatures are not excessive, and where some heat is needed every month in the year, electric air heating is growing in popularity. The skeptic may say that it can't be done, but the manufacturers of electric air heaters are enjoying good business.

Industrial Necessity Makes Re-routing of Human Effort Necessary

THAT the present condition of high wages and a shortage of skilled men in many industries, particularly building, will cause a re-routing of human effort, is not unlikely. "Social standing" and "respectability," the fetishes which have made indifferent counter-jumpers out of potential good mechanics, do not appear as formidable as in the past. In those industries where opportunities have been opened to the embryo mechanic in the form of apprentice schools, there has been no dearth of applicants, principally of good types.

An eastern railroad house-organ, in commenting on the foolishness of calling one job "respectable," in comparison with another, has the following to say on this subject:

"From blue flannel collar to white collar has been the traditional general conception of advancement in the world of work. But a shortage of skilled hands to do necessary tasks has caused a New York

institution to search out white collar men there and set them to learning various manual trades. Thus comes a re-routing of human endeavor, a departure from an accepted program. If this shift in transplanting men goes far enough, it will inevitably result in fresh emphasis being placed on the dignity of those who toil with their hands.

"Failure to learn real values in life can cost a young man his chance for success. On the false notion that greater 'respectability' would meritedly be attained by his taking a white collar 'position' for which he is unfitted, he may arbitrarily pass up opportunity to go with the flannel shirt gang where his aptitude could win for him wealth and justified pride in achievement.

"A great many harmful generalizations have been accepted by the public without question. One of them grew out of the fact that certain people who thought well of themselves put the stamp of their disapproval on people engaged in manual tasks. Others who had no business letting such an idea become popular have brainlessly permitted this stereotyped picture to persist unchallenged. But it is being challenged by cold necessity today.

"America has hard, sweaty, grimy work which must be done. The financial reward is attractive. Adaptability granted, the proposition of changing from the white collar into the laborer's flannel one is basically sound. On the ground floor, in the dirt and smoke, is the best place in the world to gain a working knowledge of men and material operations."

Possibly the next few years will produce many men who can describe their successful career thus: "From white collar to flannel collar to fur collar."

Prizes Offered for the Best Paper on Customer-Ownership of Securities

MANAGERS of public utility companies through out Colorado, New Mexico and Wyoming, together with the Rocky Mountain Committee on Public Utility Information, have agreed to assist those within their territory who wish to participate in a national essay contest on the benefits of customer-ownership. This contest which is being conducted by Forbes Magazine, a New York financial and business publication, is open to everyone. Neither the utilities nor the Committee are in any manner connected with the contest but have offered to assist in making it a success by providing some of the data to all who wish to prepare papers.

It is to the material interest of public utilities that there be a wide and sympathetic understanding of utility problems on the part of the public. All western utilities have an excellent opportunity to capitalize on the nation-wide interest which is being aroused by this contest. We commend it to the attention of those officials in the various electrical utilities whose duty it is to foster the public's goodwill. The stimulation of local interest will have a favorable reaction.

CURRENT COMMENT



The year 1922 was a record one from the standpoint of construction activity. This fact is borne out in a report prepared by Secretary of Commerce Hoover

1922 Set New Records for Building Activity

for President Harding in reply to a query as to the advisability of undertaking an extensive government construction program. The present administration has the

direction of Congress to carry on a very considerable volume of construction work in all parts of the country. The President's query was prompted by the desire to be thoroughly acquainted with economic conditions in the building industry before determining to speed up the construction program to which the administration is committed.

A survey of the situation in the building trades brought out the following conclusions:

1. The year 1922 was a year of very large employment and activity in the construction trades and at the end of the year stocks of construction materials were greatly reduced. Since the beginning of the present year there has been even more activity than in the same period last year and the contracts let in the past few months are of larger volume than any hitherto entered into in a similar period. Advance orders for construction materials are upon a very large scale.

2. Labor in the construction trades and in the manufacture of materials is not only at full employment but there is actually a shortage in many directions.

3. Transportation facilities available for the building materials are fully loaded and almost constant car shortages are complained of with consequent interruption in production.

Secretary Hoover's reactions to the results brought out by the survey are contained in his reply to the President, in which he says:

"For the government to enter into competition at the present moment will give no additional employment to labor and no additional production of materials but must in the broad sense in the end displace that much private construction. The governments, nationally and locally, are in a much better position to hold construction work in abeyance than are private concerns, and are in better position to speed up in times of less demand as we did in the last depression as the result of the Unemployment Conference. We can, by this means, contribute something to a more even flow of employment, not only directly in construction work but in the material trades.

"I would recommend, therefore, that you direct the different divisions of the government to initiate no new work that is not eminently necessary to carry on the immediate functions of the government and that there should be a slowing down of work in progress so much as comports with real economy in construction, until after there is a relaxation in private demands."

In the preparation of a plan for meeting the power demands of the future, a comprehensive knowledge of the water power resources of the nation is highly essential. Such knowledge is of particular importance to the West because it is estimated that fully 75 per cent of the potential water power of the United States

Survey Shows Power Resources of Snake River

is located west of the Rocky Mountains. The announcement of the U. S. Geological Survey that it will shortly publish a report on the water power resources of the Snake River will consequently be of considerable interest to central stations and engineers. The report will contain the results of an examination of the river between Huntington, Ore., and Milner, Idaho.

In its western course across southern Idaho, the Snake River has a total fall of approximately 2,000 ft. between Milner and Weiser. Of this drop, 340 ft. is concentrated at two points—at Twin Falls, where the fall is 140 ft., and at Shoshone Falls, where it is 200 ft. Shoshone Falls is now used for the development of power, but Twin Falls and many other places, fully described in the report, are valuable potential power sites not yet developed.

Prior to 1884, when the main line of the Oregon Short Line Railroad was completed across southern Idaho, the Snake River plain from Pocatello westward was a sagebrush desert. Boise had a population of about 50, and other points at which there are now large villages or cities were little more than stage stations. By 1890 the total population of the plain was perhaps 15,000, and a small amount of land was being irrigated. About 1900 the country began to realize that desert lands could be reclaimed by irrigation, and between 1900 and 1910 many extensive government and private irrigation systems were put into operation in southern Idaho and in other western states. Tracts in southern Idaho amounting to more than 1,200,000 acres are now being irrigated. With the growth of population that followed the opening of these vast tracts there came naturally

a demand for power. The Geological Survey's report gives a history of the development of power in this region. The first developments were small and were under local control, but as the field of operations widened interference between companies led to intense rivalry and to over-development, which was followed by depression and reorganization, resulting finally in the formation of the Idaho Power Company, which now owns and operates practically all the hydroelectric developments in southern Idaho along the Snake River. The report gives the history of each project in detail and describes the project works, at which over 70,000 hp. is now being made available for use.

The report will contain maps and descriptions of 19 sites at which 250,000 hp. could probably be developed, even during times of low water. It sets forth the amount of water available for power development and the scheme by which the fullest use may be made of the water.

Steam power plant equipment will find a ready market in Japan since hydroelectric companies have awakened to the fact that their present systems are inadequate to care for the demand without the addition of auxiliary steam power stations.

Steam Plant Equipment For Japan

The Industrial Machinery division of the Department of Commerce reports that conditions in the island empire are such that power companies are realizing the absolute necessity of providing for standby service of some character.

The past winter has been an exceptionally dry one, with much less rain in the autumn than usual. As a consequence the streams and lakes upon which the various hydroelectric companies depend for power are very low, especially in eastern Japan. The Katsuragawa and the Kinugawa electric power companies, which supply the greater part of Tokyo with current, have been unable to meet the demands and as a consequence the Tokyo Electric Light Company has had to fall back on power from the steam plants in Asakusa which have been operating at full capacity.

Opportunities for trade in Australia in electrical and allied lines are better today than they have been for the past decade, according to W. G. Watson, managing director of W. G. Watson

Australia Offers Market for Electrical Goods

& Company, Ltd., electrical engineers and merchants of Sydney, who is in this country on a business trip. Increases in plant capacity, delayed for several years owing to inability to get equipment during the war, are rapidly nearing completion. As this additional power is made available, the field for electrical appliances may be expected to become more active.

While considerable interest has been shown in hydroelectric projects, attention at the present time is directed toward the development of the enormous low grade brown coal deposits, where fuel can be

delivered at the plant as low as 54 cents a ton. The new Morwell plant in Victoria is located on the edge of the coal deposits and is rapidly nearing completion. Power from this plant will be delivered to Melbourne and other large cities over several hundred miles of 150,000-volt transmission lines.

Mr. Watson's reflections regarding the American manufacturer and the Australian market are interesting. "Reduce your prices and you can sell the goods" is his counsel to those manufacturers who would develop an Australian market. He also suggests that a careful study of existing conditions and requirements be made before entering the market. Excessive transportation costs coupled with high prices prohibit the universal use of American made electric ranges.

Radio broadcasting is on the eve of a new era of development. After an investigation which has lasted almost a year, the National Radio Conference

Future of Radio Broadcasting is Now Assured

has promulgated a set of regulations which have been accepted without limitations by the Department of Commerce. To use the words of Secretary Hoover, "the recommendations represent a step in ideal development of measures for the prevention of interference in public broadcasting."

The report recommends making available all wave lengths from 222 to 545 meters for public broadcasting, the various possible bands to be assigned to different stations so as not only to reduce interference, but also to build up zonal regions of distribution. The stations are divided into classes according to their power rating, and wave lengths assigned accordingly. Amateurs are given an entire area which will limit the possibility of interference with public broadcasting stations.

One of the important recommendations of the conference relates to the consolidation of broadcasting interests in each locality. In view of the limited facilities available and the uneconomic and tentative basis of present-day broadcasting, the conference has suggested that those desiring the establishment or maintenance of stations consolidate. It is felt that by such a plan the public will be benefited and broadcasting handled in an economic and permanent fashion.

The department fully accepts the recommendations of the conference, but recognizes a number of difficulties in placing the plan abruptly into action: First, the hardship that it may cause to various stations to move arbitrarily to new wave lengths; second, the difficulties introduced by the ship to shore communications which are now working to some extent on 300 meters and also on 450 meters.

It is to be hoped that the necessary legislative measures to carry out the recommendations of the conference will be passed immediately. At the same time steps must be taken to provide for the increased radio personnel needed by the Bureaus of Navigation and Standards of the Department of Commerce, for the enforcement of the regulations.



THE Midway plant of the San Joaquin Light & Power Corporation located at Buttonwillow, near the Elk Hills oil fields, uses natural gas for fuel. The capacity of the plant, which consists of two units, is 25,000 kva. The first unit was erected in 1921 and the second in 1922 and the construction is so arranged that additional units may be added.

The Apartment Electrical



TO ATTEMPT to analyze the reasons for the growing popularity of the modern apartment would involve a discussion of the fundamental changes in the mode of living of the American people during the past decade. An increasing metropolitan population, the servant problem, the desire on the part of the housewife for more conveniences, comforts and fewer responsibilities, and the shortage and high cost of building homes have been some of the controlling factors in the gradual increase in the number of apartments in the larger cities. In making the apartment a more desirable dwelling place, the builder has incorporated new ideas for increasing the comfort and domestic felicity of his tenants as fast as they have been called to his attention. In the development of the apartment it is only natural that the attention of the builder would sooner or later turn to electricity and to the multiplicity of time and labor saving devices that have been developed for its utilization. From the standpoint of the central station, the manufacturer and the dealer, this interest which is being displayed by the apartment builder is of decided importance, for to them it means increased sales and revenue.

From a study of the application of electricity to apartment houses—and by that is meant not only lighting, but cooking, water heating and in some localities, air heating—it would appear that apartments offer most favorable opportunities for develop-

By O. R. Doerr

Great Western Power Company, Oakland, Calif.

EXPERIENCE with thirty-seven apartment houses in Oakland, Calif., which are either wholly or partially electrified, has proven that intensive development of this field is highly desirable for the central station, manufacturer, jobber, dealer and contractor.

ment. In Seattle, Portland, Boise, Butte, Denver, Salt Lake City, Los Angeles, Oakland and San Francisco there is an increasing tendency on the part of the central stations to recognize the great service that can be rendered to the public and the large increase in revenue possible in developing this service. Attractive rates have been put into effect, servicing facilities provided, and sales effort expended to increase the use of electricity in apartment houses. The result has been a ready response on the part of the builder with an increasing number of apartment houses equipped with electric ranges, electric water and air heaters.

It is true, of course, that this attitude, as is the case with all things new and untried, was not formulated in a month or a year. The pioneering activities had much resistance to overcome and the results were watched with a skepticism comparable to that attending the adoption of electricity for lighting. Many took the stand, "Be not the first by whom the new is tried." Yet the fact remains that those builders who were the first to make complete electrical installations in their buildings are continuing the practice in the construction of subsequent buildings.

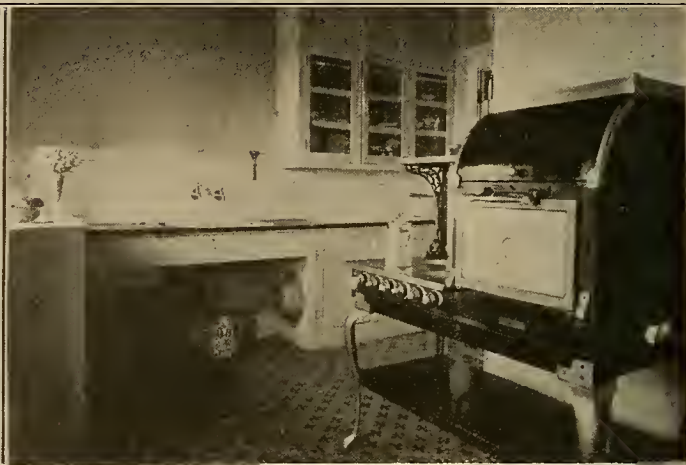
Owing to the comparative novelty of completely electrifying apartments, a discussion of the results obtainable over a long period of years is impossible. However, there are installations in Oakland, Calif., which have been in operation a sufficient time to

conclusively prove that service of this type is exceedingly desirable from every standpoint.

Electric cookery has been, to a greater or less extent, before the public eye for some time. Coincident with the wider utilization of the electric range came its application to the apartment house. In fact, apartment houses have done much to spread the idea. There were installed in the Como Apartments in Oakland, early in 1916, thirty-seven of the early type electric ranges, all of which are in operation at the present time after more than seven years of almost continuous service. In this connection it is interesting to note that the builder of this apartment house

rooms each, with a 7-kw. range in each apartment. Figures on the consumption of energy, in this case over a period of nine months, show the average monthly bill for each consumer is \$5.32 with the individual bills ranging from \$4.54 to \$6.30 per month. The average consumption per apartment per month is 134 kw-hr. while the maximum consumption for any apartment during one month was 263 kw-hr. The total revenue from this apartment house for the nine-month period was \$250.55 and the average monthly revenue per kilowatt of load was \$0.76.

Electric air heating and electric water heating are the last of the major electric services applicable



On the left is the electric fireplace in one of the modern apartments, while on the right is an electric range which has been in operation seven years without interruption.

has since adopted a policy of completely electrifying most of the buildings which he has since constructed.

Ranges Only Installed

Figures on the consumption of electrical energy in this apartment house over a period of twelve months show the average consumption per range per month to be 79.9 kw-hr., ranging between a maximum of 145 kw-hr. and a minimum of 60 kw-hr. Each range has a capacity of 7 kw. or a total for the entire house of 259 kw., served by a 50-kw. transformer. The average monthly bill per consumer for this service is \$3.18. An idea of the month to month fluctuation in the consumption can be gained from the following figures which show the amount of energy consumed by a typical range over a period of twelve months:

| | |
|------------|--------------|
| Jan..... | 110 kw-hr. |
| Feb..... | 95 " |
| March..... | 82 " |
| April..... | 79 " |
| May..... | 66 " |
| June..... | 71 " |
| July..... | 82 " |
| Aug..... | 104 " |
| Sept..... | 124 " |
| Oct..... | 79 " |
| Nov..... | 99 " |
| Dec..... | 85 " |
| Total..... | 1,076 kw-hr. |

In the case of the above apartment house, the range and lighting service are metered separately.

A typical example of an apartment house where a cooking and lighting rate is in effect is the Reynard Apartments, of eight apartments of two and three

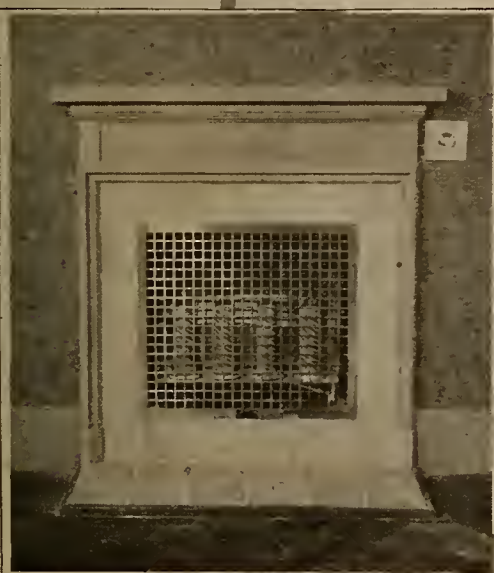
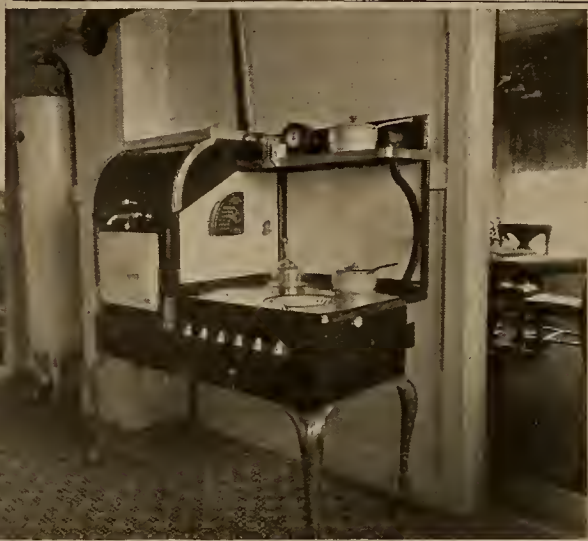
to home use which have been applied to the apartment. Owing to the remarkable results obtained, this type of service is rapidly growing in favor both with the builders and with the tenants.

The theory that the cost of electric heating is excessive is disproven in the case of the Merritt Grand Apartments, which are totally heated by electricity. The average monthly cost of heating a single apartment is \$3.66, based on the bills for a period of a year. During November, December and January the average bills were \$7.48, \$7.26 and \$8.14 respectively, while the bills during the summer months averaged \$0.75 per apartment. The average monthly revenue derived by the central station from the heating installation in this apartment house is \$40.90 while the average revenue per kilowatt per month is \$1.28. The apartment house contains 12 apartments and has a total connected load (heating only) of 32 kw.

A Complete Electrical Installation

A real demonstration as to the practicability of a complete electrical installation in an apartment house is the Kisich Apartments in which electricity is used for lighting, cooking, water heating and air heating. The building contains two 4-room apartments, two 3-room apartments and one 2-room apartment. In each apartment the range, air heaters and lights are served through one meter and the water heater through a second meter.

A summary of the monthly consumption for each apartment during the six winter months from October to March, inclusive, shows that the tenant



I NSTALLATIONS such as these in the apartment houses of Oakland, Calif., are spreading the message of electricity in the home. Hot water, heat, lights, and cooking with all of these conveniences and cleanliness of electricity for less than twelve dollars a month constitute a strong argument from the apartment house owner's standpoint. Each passing month sees more electrified apartments being erected.



paid an average of \$11.60 per month for this service, \$8 of which was the cost of operating range, air heaters and lights and \$3.60 of which was the cost of operating the water heater. The range in the average monthly bills is from \$7.85 to \$15.60. The largest bill paid by any of the individual consumers during the six-month period was \$21.48. The total connected load for the five apartments is 67 kw.

In the apartment house owned by Eva G. Hutchinson at 412 Staten Street, every electrical feature which goes to make a dwelling modern and desirable has been incorporated. This building, as well as many others in Oakland, was constructed by Fred A. Muller, a builder who has recognized the part that electricity is to play in the modern home.

From the standpoint of the central station, the electrification of the apartment house is highly desirable for several reasons. Primarily it means more load, and more load means increased revenue. It can be assumed, generally, that a range load will produce in revenue approximately \$0.75 per kilowatt connected per month, a water heater load approximately \$2.00 per kilowatt connected per month and an air heating load \$1 per kilowatt connected per month. Furthermore, the revenue derived from this type of load is commensurate with the cost to serve an equal load of another character. As in the case of electric appliances the greatest benefits will accrue from a more complete saturation of the distribution lines of the central station with range, water heater and air heater load.

Diversified Character of Load

Another of the basic reasons which makes load of this type highly desirable for the central station is its extreme diversity. In practice it has been found that, in the case of a large range installation, the transformer capacity required to serve this load need be but 20 per cent of the total connected load. Thus the Como Apartments, mentioned before, with a total connected load of 259 kw., are served by a 50-kw. transformer. A load curve over a period of a week shows a maximum demand for this installation of 28.8 kw. Similarly it has been found in actual practice that the diversity factor for an air heater load is approximately 25 per cent. It is readily seen then that such a load, on account of its

diversity, does not appreciably affect the peak as would be the case of an equal installation of motors. Moreover, the demand is such that in many cases it tends to fill in the valleys in the load curve. While the above reasoning applies to ranges, air heaters and water heaters in general, there are further considerations which make a complete electrical instal-

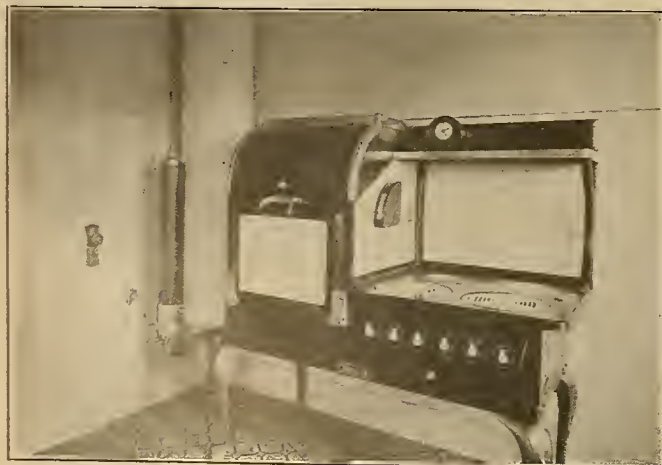


The electric range—so simple a child can operate it.

lation in an apartment house even more desirable. Because the load is concentrated in one building, construction costs are less than would be the case if an equal number of individual installations were made in one district. Similarly the cost of overhead, meter reading, collections and servicing is reduced.

From the sales standpoint, an apartment house installation requires only slightly more sales effort for a group of from five to twenty ranges and water heaters than is required in placing an installation in one individual home. Furthermore, because of the transient nature of apartment house tenants a completely electrified apartment is particularly beneficial to the entire industry, for tenants who have once used electricity for cooking, air heating and water heating will demand that service wherever they go.

Taking the experience of the past as a criterion, it is apparent that the complete electrification of the apartment house offers a profitable and desirable field for central station, manufacturer, jobber, contractor and dealer.



Range and water heater installation in one of the kitchens.

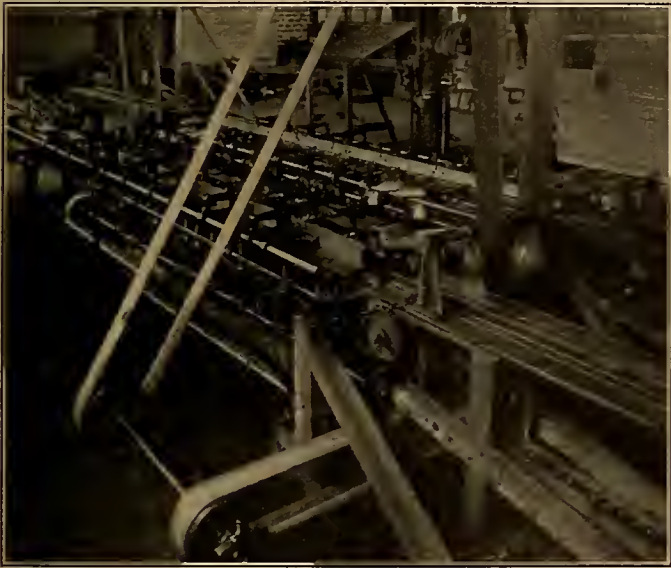


One of the completely electrified modern apartments.

Modern Automatic Machinery Aids in the Manufacture of Crossarms

MANUFACTURING wooden crossarms in such quantities that it has been able to get into the national market for this equipment has been the work of the Barnes-Lindsley Manufacturing Company, of Portland, Ore. This company started the manufacture of wooden crossarms for distribution and telephone lines in 1908 and since that time has made rapid strides in the development of its plant.

To be able to turn out a sufficient number of crossarms daily the company was forced to secure a new machine to be used in the boring and shaping



Augers on the automatic crossarm boring machine, pictured above, bore on the forward and return strokes of the carriage.

of the wooden arms, as this process is the factor which determines the speed of the entire plant. The president of the company, seeing this need for a specialized machine, invented and patented a new machine which has augers capable of penetrating twenty-four 4-ft. crossarms a minute. This same machine also has an attachment which shapes the planed crossarms, after they have been bored for pins and for bolts.

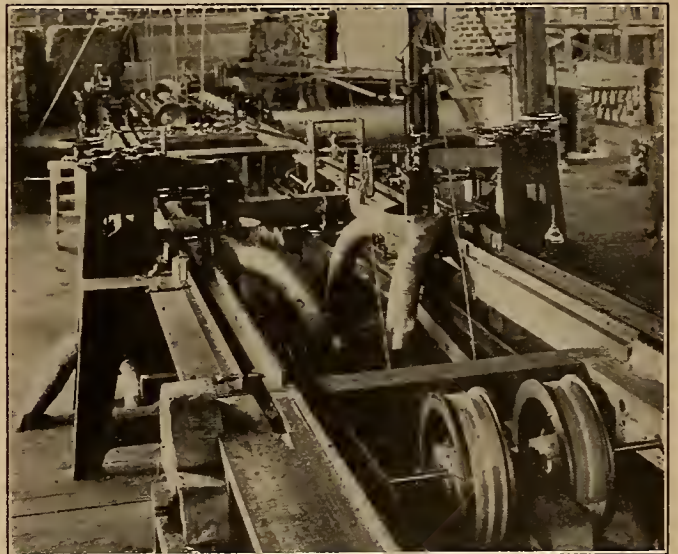
In the manufacture of this wooden pole line equipment, the lumber must first be seasoned in dry kilns and is then run through planers to secure the exact widths desired. When planed the arms are cut to the customary lengths, by circular cut-off saws, which are so arranged that the lengths being sawed may be altered by a changing of the stops on the saw tables. From the saw tables the material is taken to the boring machines, which are the only ones of their kind in existence.

The boring machines are entirely automatic, the only attendants necessary being two men to feed the half-finished crossarms onto the conveyor belts leading into the machine. The crossarms are moved, by

the belt, into the machine the proper distance and are then stopped automatically and the boring starts immediately. Augers are located on two sides of the machine and boring is done on both the forward and return stroke of the carriage. Holes for the bolts, which are used to attach the arms to the poles, are also bored at this time, by augers which operate from below. The holes that are bored laterally are for the pins. The boring machine has a capacity rate of 11,500 finished crossarms per eight-hour day. This number is equivalent to two carloads.

From the boring machine the crossarms are conveyed on an endless belt to the shaper which is operated by compressed air. In this machine the crossarms pass under a trip device which releases a hammer that falls and brands each arm. As the arm clears the trip the first set of swinging shaper heads is released and these heads shape one end of the arm. When the first set of heads has done its work, the tension releases and the arm passes on to where the second set falls on the arm and shapes the other end. The center section of each crossarm is not rounded so that the arm may be bolted flush against the pole.

It is only because of the automatic machinery installed in the plant that the Barnes-Lindsley Manufacturing Company is able to compete with crossarm manufacturers throughout the United States and Canada. The specialized equipment installed in the plant is driven largely by electrical motors. This plant shows how modern electrical equipment and



Crossarms move from the boring machine on an endless belt to the shaping heads, in the foreground of the picture, and are there rounded by shaper knives operated by compressed air.

modern machinery can work together to turn out a product in sufficient quantities to enable the manufacturer to compete with eastern manufacturers in their own territory.

The Midway Plant of the San Joaquin Light & Power Corporation

THE Midway Power House of the San Joaquin Light & Power Corporation is situated at Buttonwillow, Calif., on the Bakersfield-McKittrick branch of the Southern Pacific Railroad Company, approximately 25 miles west of Bakersfield. This situation was selected for various reasons, some of which were its proximity to the Elk Hills gas fields, its location on a railroad and an 8-in oil pipe line, and the fact that it was known that suitable water in large quantities could easily be obtained. The property itself consists of 115 acres. The power house and operators' cottages are located on the south 35 acres which face a paved highway.

The ground was broken for the first unit Aug. 16, 1920, and the turbo-generator was placed in service the first week of June, 1921. Ground was broken for the second unit Feb. 12, 1922, and the turbo-generator was placed in service Aug. 1, 1922. Each unit has a capacity of 12,500 kva., generating at 11,500 volts.

The power house building is of steel frame construction. The walls are reinforced concrete except the west wall which is hy-rib and plaster. This wall is of temporary construction, to be removed in the event of future extensions. The roof slab is reinforced with electric weld fabric and is overlaid with a five-ply white top asbestos felt roofing. Treated concrete floors are used throughout the building with the exception of the turbine gallery floor which is checkered steel plate. The turbine room is 160 x 40 ft. The two units are placed longitudinally with their axis in one line. The two steam jet air pumps are on the same floor level as the generators. The turbine driven circulating pumps, exciters, boiler feed pumps and control sets are located on the ground floor. The motor and turbine driven hot well pumps are located in pits at the end of each condenser. A standard gage railroad track runs into the turbine room, permitting the unloading of heavy pieces of equipment by means of an electric traveling crane, having a capacity of 50 tons and operated at 440 volts a.c.

Boiler Room Equipment

The boiler room is 200 x 70 ft. and contains space for 16 boilers. At present it contains eight Stirling boilers, each having 8,224 sq. ft. of heating surface, and six Connelly boilers of 8,250 sq. ft. capacity, arranged in batteries of two boilers each.

By E. A. Quinn

General Superintendent, San Joaquin Light & Power Corporation

***T**O efficiently serve its customers the progressive central station must take advantage of every natural resource. The presence of large quantities of natural gas developed as a byproduct from oil wells in its district had a definite bearing upon the locating of a steam-electric plant of the San Joaquin Light & Power Corporation at Buttonwillow, Calif. The low cost of the gas enables this company to supplement its hydroelectric power with the energy generated in this steam plant.*

The boilers are the Class M, No. 30 with 48-in. mud drums and three 42-in. steam drums. The tubes are 2¾ in. in diameter, No. 8 gage. All boilers are equipped with the San Joaquin gas burners and Hammel oil burners. The oil burners installed are to be used in emergency in case of a break or other interruption to the gas line. The Stirling boilers are fitted with B & W. superheaters designed to superheat the steam to 125 deg. F. The Connelly boilers are fitted with Foster superheaters

designed to superheat the steam to the same extent. The working pressure is 260 lb. The boilers are equipped with Diamond soot blowers, which would come into service in the event of the use of oil. The stacks are 90 in. in diameter and extend 120 ft. from the concrete foundation at the ground level. One stack is provided for each battery of boilers and each stack rests on a breeching common to each boiler.

The electric switch gallery is 160 x 18 ft. The switchboard room and bus compartments are of reinforced concrete. Steel window sash and doors are used throughout the building, making it an absolutely fireproof structure.

One ton per square foot was allowed for all building foundations. Using this low factor gives a very large safety factor, as the top strata of the soil, 4 ft. in thickness, is a hardpan which has 6 ft. of compact sand and clay underlying it. On account of the water rising within 12 ft. of the ground surface, it was necessary to use piling for the turbine foundations, the piling being driven to an average depth of 22 ft. In each turbine foundation, the piling was allowed to extend 18 in. and a reinforced concrete mat 24 in. in thickness was poured, making a very substantial construction to support the turbine foundations. The foundation for the turbines is of reinforced concrete rising 16 ft. above the ground floor level. The boiler settings are supported by a mat of concrete 30 in. in thickness, reinforced with old railroad steel. Each boiler requires 110 yd. of concrete and the reinforcing was placed where the greatest weights were to be sustained.

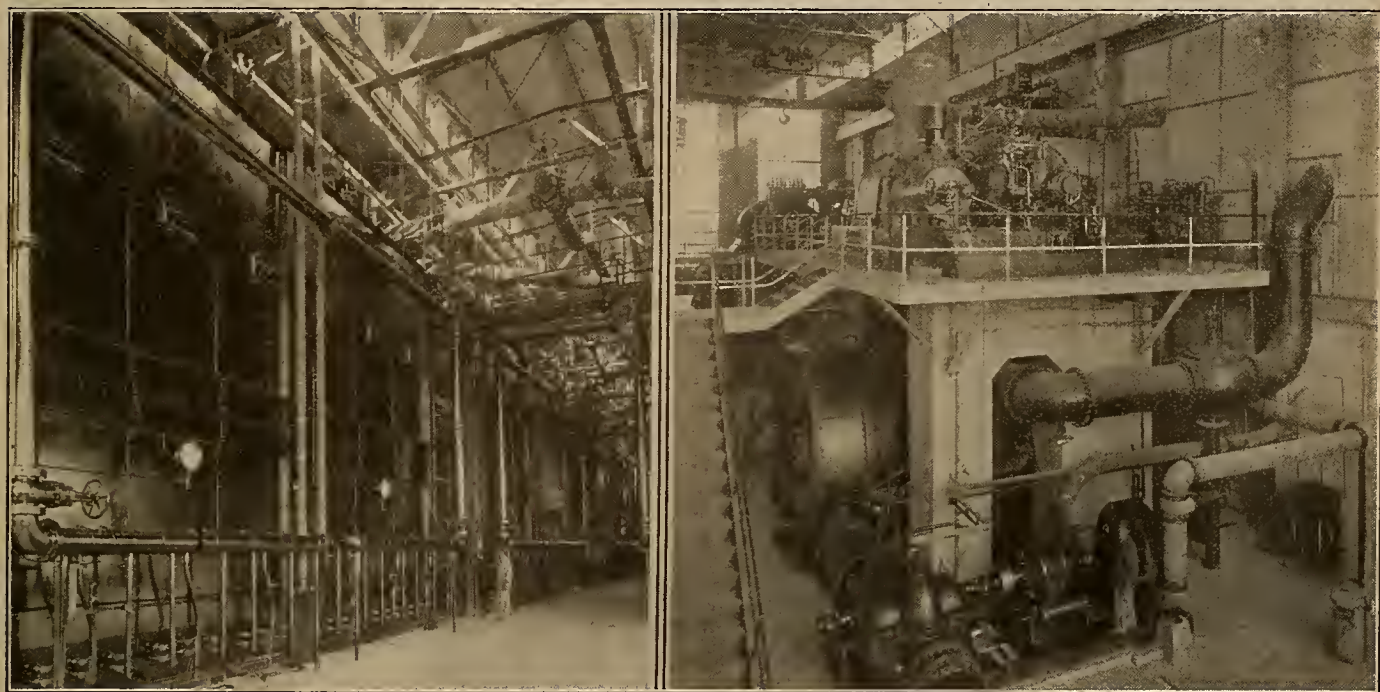
Two Turbo-Generators Are Installed

The No. 1 turbine is a horizontal Curtis type, operated at 1,800 r.p.m. It is designed for 250-lb. pressure and 125-deg. superheat. The generator is a three-phase, 60-cycle, 11,500-volt machine, rated at 10,000 kw. at 80 per cent power factor. The tur-

bine is connected to a three-pass surface condenser, containing 30,000 sq. ft. of cooling surface. The tubes are 1 in. in diameter and 20 ft. 2 in. in length. They are seamless drawn Muntz Metal and this composition is also used for the tube sheets. The condenser is provided with a 24-in. double suction volute pump capable of circulating 24,000 gal. of water per min. and is connected through reduction gears to a 400-hp., two-stage Curtis steam turbine. The air is removed from the condenser by a Wheeler steam jet air pump.

The No. 2 turbine is an Allis-Chalmers type, operating at 1,800 r.p.m., designed for 250 lb. pressure and 125 deg. superheat. The generator has the same characteristics as the one connected to turbine

lating water and use it over and over again. A spray cooling pond is provided for No. 1 unit. This pond is 190 x 290 ft. and is 4 ft. 6 in. deep. The walls and floor are of reinforced concrete. The walls are cantilever type, 4 in. thick at the top and 6 in. at the floor. They are reinforced with $\frac{3}{8}$ -in. corrugated bars, spaced 9 in. vertical and $\frac{3}{8}$ -in. bars 12 in. on the horizontal. The floor is 4 in. thick reinforced with 2-in. mesh No. 16 wire netting. The sprays consist of 360, 21½-in. nozzles formed in clusters of five nozzles each. The main pipe header tapers from 30 in. to 12 in. and the laterals taper from 10 in. to 6 in. No valves are provided to sectionalize the sprays, as the expense of installing valves was a large item and the result which could be obtained



Boilers and steam turbines at the Midway plant. Natural gas is burned under these boilers by specially designed burners.

No. 1. The turbine is connected to an Allis-Chalmers three-phase surface condenser containing 30,000 sq. ft. of cooling surface. The tubes are 1 in. in diameter and 19 ft. 2 in. in length. The tubes and tube sheets are of Muntz Metal as in the No. 1 turbine. The condenser is provided with a 24-in. double suction volute pump capable of handling 24,000 gal. per min. and is connected through reduction gears to a 475-hp. Allis-Chalmers steam turbine. The air is removed from the condenser by a Croll-Reynolds evacuator. Two 4-in. single stage volute pumps are provided for each condenser to remove the condensate, one pump being connected to a 25-hp. steam turbine and the other to a 25-hp., 440-volt motor. A 30-in. double suction volute pump capable of handling 25,000 gal. per min., connected to a 400-hp., 2,300-volt motor, is held as a reserve. The piping to this pump is so arranged that the pump can be used on either unit in case of failure or trouble of either of the steam driven circulating pumps.

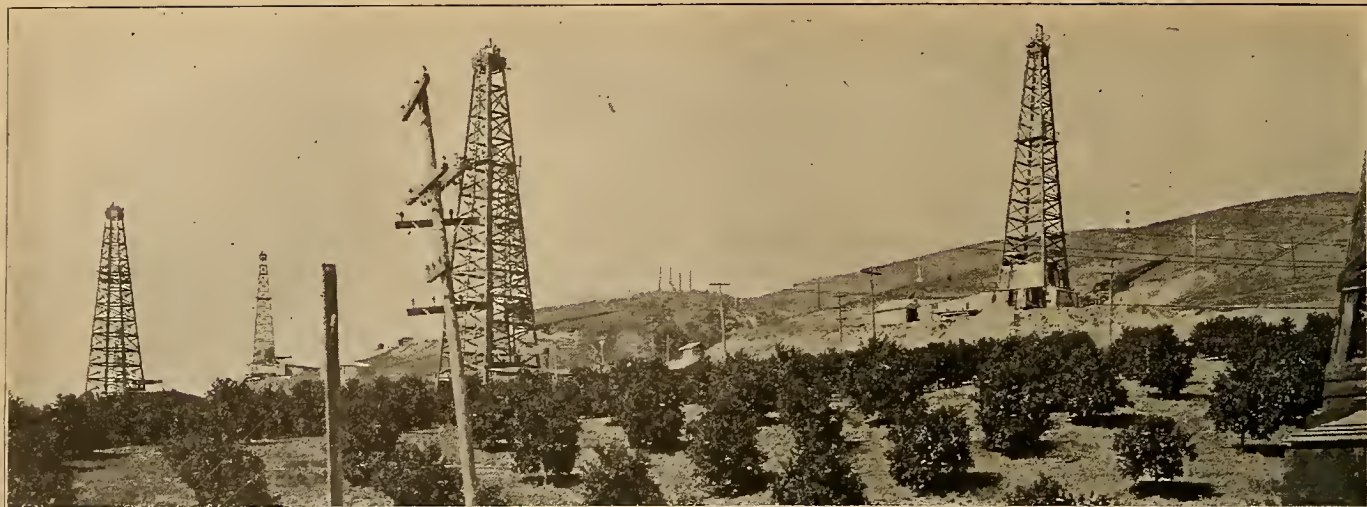
Circulating Water Is Re-cooled for Use

As all water for this plant is obtained from wells, it has become necessary to re-cool the circu-

would not justify the expense. The sprays are designed for 25,000 gal. per min. with 6-lb. pressure at the nozzles.

For the No. 2 unit a cooling tower was built. The pond of the tower is 190 x 312 ft. and is 3 ft. 6 in. deep with the same type of walls and floor as the spray pond. The tower is 24,000 sq. ft. in area and consists of fourteen towers, each 10 ft. wide, 180 ft. long and 24 ft. high with 12-ft. spacing between towers. Each tower has seven sprays with 3-ft. spacing between trays and 6 ft. between bottom tray and floor of the pond. Copper nails and brass bolts were used throughout.

High pressure steam piping was designed for 550 deg. F. All pipe is extra heavy steel with wrought steel Van Stone type flanges. All fittings are cast steel and valves are cast steel with Monel metal trimmings. Boiler feed piping is designed for 230 deg. F. 275 lb. working pressure. Pipe is extra heavy steel galvanized after being flanged. All pipe over 3 in. has semi-steel Van Stone type flanges. Fittings are extra heavy semi-steel and valves are semi-steel with bronze trimmings. Blow off pipe



Natural gas to fire the boilers of the Midway plant is secured from oil fields of this character. Electricity generated at the plant is then transmitted to the oil fields and is used in pumping and drilling wells that more oil may be secured.

pipings is extra heavy steel, galvanized after having been flanged. The circulating piping inside the building is cast iron; outside the building, riveted steel plate. The discharge pipe to the spray pond is 30 in. in diameter and the one to the cooling pond 36 in. The suction lines are 30 and 36 in. The atmospheric relief lines are 30 in. in diameter and are of riveted steel plate.

Water Obtained from Deep Wells

Water for all purposes is secured from wells sunk on the property and are known as Nos. 1, 2, 3, 4, 5 and 6. No. 1 is 548 ft. deep; No. 2, 289 ft.; No. 3, 365 ft.; No. 4, 442 ft.; No. 5, 388 ft.; and No. 6, 467 ft. deep. All the wells have 12-in. double casing, the upper 80 ft. of Nos. 1, 2 and 3 is 16-in. casing. This size casing was installed in order to use deep well pumps, if this should be found necessary. The wells are of the open bottom type with the casing perforated at the water strata. When conditions of the soil warranted it, a very careful log was kept of each well while the casing was perforated at the best water sands. The water is soft, containing a very small quantity of salts, and is used in the boilers untreated and requires but very little compound to keep the scale down to a minimum. All wells are landed in hard clay and the wells drilled through to sand. The wells develop 500 gal. per min. with the exception of No. 1 which develops 750 gal.

In order not to overwork the wells, pumps having a smaller capacity than that of the wells are installed. No. 1 well is served by a 700-gal. deep well pump and is only used in emergency; Nos. 2 and 3 are connected to one 750-gal. volute pump; Nos. 4, 5 and 6 are connected to a 1,000-gal. volute pump. All the pumps are motor driven.

The main pump house is of reinforced concrete construction and has a 12-ft. pit. The pump for Nos. 4, 5 and 6 wells and two 500-gal. booster pumps are located in this pit. A motor driven deep well pump is on the upper floor of the pump house. The booster pumps are operated by float switches installed in a 20,000-gal. steel tank which has an elevation of 60 ft. The water from this tank is used for make up, cooling and domestic purposes. A 12 x 7 x 10-in. duplex fire pump, which is used principally for boiler cleansing and tests, is installed in the boiler room. This pump has a double suction line; one takes the water from the 20,000-gal. tank and the other from the cooling pond. This gives a large supply of water in case of fire.

On account of the compactness of the sand underneath the hardpan, it has been found practically impossible to dispose of water by seepage. The cooling water from the transformers and oil coolers, and also the heater overflow are discharged into the cooling pond. Cooling water from the auxil-



A row of cottages erected by the San Joaquin Light & Power Corporation for operators stationed at Midway steam plant.

aries and the blowoff water from the boilers is finally discharged into a concrete sump. The concrete sump is pumped out by a 200-gal. per min. vertical sump pump driven by a motor and controlled by a float switch in the sump. The water is finally discharged to a ditch which carries off any overflow.

Boilers Are Fired with Natural Gas

Natural gas has been used exclusively in this plant up to date. The gas is piped direct from the Elk Hills oil fields to the power house. The gas line is 10-in. extra heavy casing and is 9 miles in length. It carries a pressure of 250 lb. which is reduced to a 75-lb. pressure. Just outside the plant is a metering station where the pressure is again reduced from 75 lb. to 25 lb. The gas then flows through the metering station and is again reduced to one pound pressure, or whatever pressure is required for the furnaces, depending on the load being carried on the turbines.

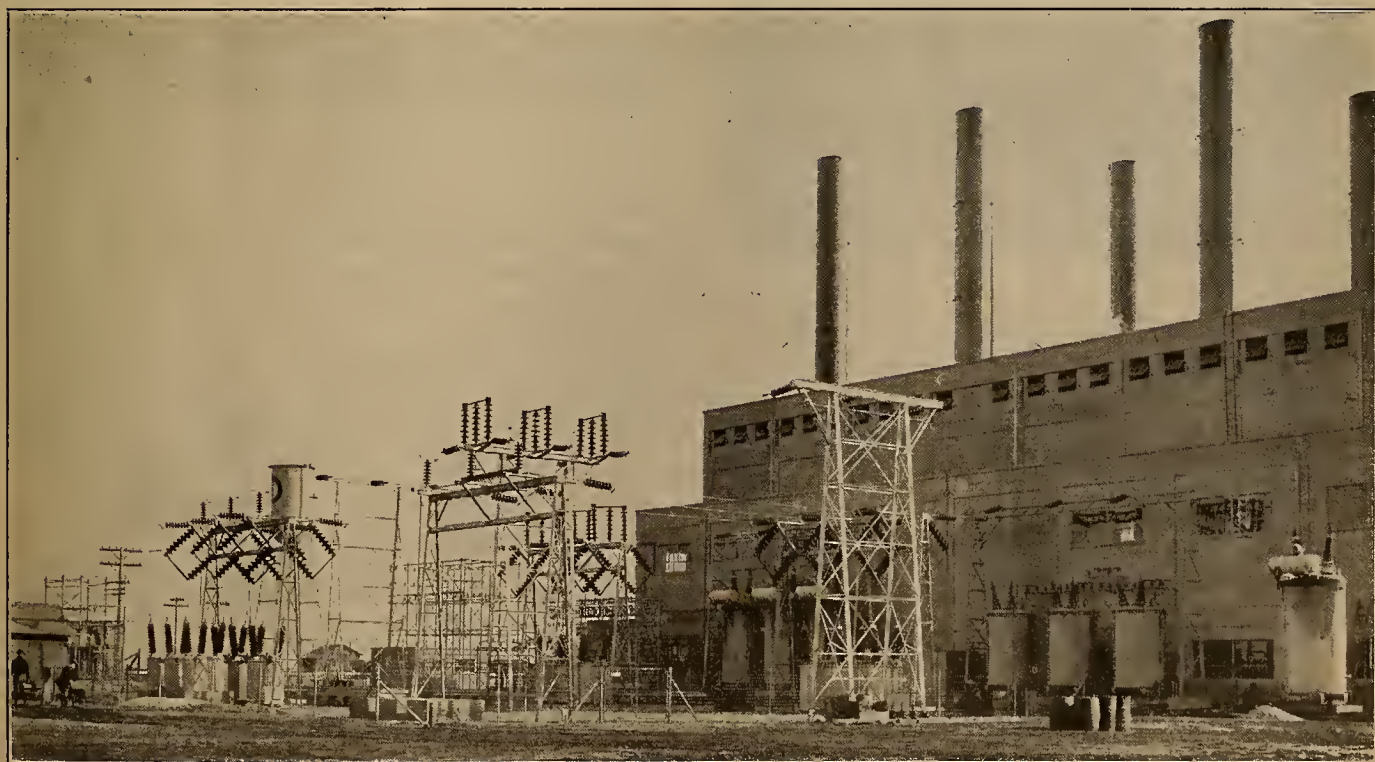
Two differential recording gas meters, recording thermometer and a 0 to 15 lb. recording pressure gage are provided for each gas measuring station. In the 8-in. vertical leads from the main gas header to the burner headers are installed 4-in. orifice meters and differential gages. The stations for the firemen are equipped with recording gages showing pressure on main gas header; recording steam gages, master steam gages, indicating gage showing temperature of boiler feed water. Indicating polyphase watt meters showing the load carried on each turbo-generator are also installed in each fireman's station. The boilers are equipped with Bailey boiler meters and the main steam header is equipped with recording thermometer, recording steam gage and an indicating steam gage. On the same panel is a recording vacuum gage and a mercury column vacuum gage. Recording thermometers and pressure gages are pro-

vided for inlet and outlet of the circulating water through the condensers. Recording thermometers are provided for the condenser hot wells. Condensate from the condenser is measured by Venturi meter tubes and the condensate from the heater is measured by a recording "V" notch meter. Recording thermometers are provided for the boiler feed lines. Two Mono CO₂ recorders are installed in the boiler room.

The Electrical Equipment Installed

The main switchboard consists of a ten panel bench board with remote control solenoid-operated oil circuit breakers. The 11,500-volt circuit breakers are in concrete cells. The 120,000-volt circuit breakers are of the outdoor type and are located in the high tension switching yard. The 120,000-volt line switches are protected by instantaneous overload and reverse power relays. All transformer automatic switches are protected with differential relays, and the 11,500-volt circuit breakers are protected with inverse time limit relays. The generators are protected by differential relays. The auxiliary switchboard consists of five vertical panels; four sections are for the exciters and one section is for station power and lights. All bus work is open and in concrete cells.

The cottages for the operating crew are located at the west end of the property. There are twelve modern 4-room stucco cottages with built-in features. Lots are 75 x 175 ft. Stucco garages 14 x 20 ft. are located at each cottage. A 6-room cottage is located in the north end of the row of cottages, and is used as a dormitory. Natural gas is used as fuel in all the cottages. The cottages have been arranged with particular attention for the comforts of the occupants during the summer months, and a big roomy screen porch runs the full width of the house.



High tension transformers and switching equipment installed at the Midway steam plant, located at Buttonwillow, Calif.

Getting a New Angle of Approach to Sell Electric Appliances

By J. E. Bullard

THERE is a department store that is making one of the very best records in the country in selling fireless cookers. It is making such a good record that those who have never investigated the case are inclined to believe that the company uses rather spectacular sales methods.

As a matter of fact, it is one of, if not the most conservative store in its city. Nothing of a spectacular nature is done in an effort to increase sales. Window displays of the cookers are made but four times a year and these displays remain in the windows but three days each.

Perhaps the cookers are mentioned in the store's advertising twenty times during the year and only four demonstrations are held. There are a great many stores selling far fewer cookers who appear to

purposes. These new ideas for using the cookers are passed on to prospective customers. People are invited to put up to them the most difficult cooking propositions so that the salesmen may solve these problems. A favorite performance is to get people to bring in old tough fowls or tough cheap cuts of beef and to cook these in the cooker, making them tender and palatable.

It is the thinking up and the carrying out of these sales-making performances that is meant by the expression, practical enthusiasm. The people who sell the cookers are enthusiastic about what can be done with them but they are working in a store where extravagant statements are not tolerated. As a matter of fact, it is often necessary to prove statements to the executives of the company. This proving of the statements, this policy of the store that no extravagant statements are to be tolerated has resulted in the sale of a great many cookers to the executives and the employees of the company.

The electrical industry has been built up very much along these lines. There would not be nearly as much electric power sold today were it not for the fact that the foundation for these sales was laid by practical enthusiasts. The same has been true of lighting, of heating and of appliances.

The great multiplicity of articles now offered for sale, however, tends to reduce this enthusiasm. It is assumed that people know more about them and it does not require so much enthusiasm to sell them. Yet just consider how effective the methods used by this department store in selling fireless cookers would prove in selling electric ranges. Practically everything this store does can be done by the person selling electric ranges, for the cost of operation plays a very small part in making sales under this system. It is just a case of something that does the work so much better, that makes a person willing to pay more for operation if necessary. After all, people are looking more for value than for economy. If they can be shown that they are getting full value for what they pay, the amount paid is not such an important item. If they are not shown that they are getting full value for what they pay, then first cost and operating costs begin to loom large.

Use New Demonstration Ideas

There are a great many ways in which electrical appliances can be used. Yet when it comes to demonstrating them, it is usually the most obvious and only the most obvious ways that are shown. A vacuum cleaner demonstration, for example, ordinarily consists of placing a rug on the floor, sprinkling it with starch, flour, salt or some other white substance and then cleaning the rug. This form of demonstration has been carried on so long that it



The electric dishwasher salesman who can suggest an arrangement similar to this for disposing of the machine when it is not in use, will be nearer to closing the sale than one who merely suggests that the device will only wash the chinaware.

be placing much more sales pressure behind them, yet sell a much smaller number of cookers.

At first thought there seems to be no reason why this store should be so successful in the selling of fireless cookers. A talk with those who actually do the selling, however, soon explains their success. These people are practical enthusiasts.

Salesmen waste no time in telling the people how much fuel the cookers save. They devote their attention to pointing out what results can be obtained in cooking. They always stand ready to prove every statement that they make. They are always seeking some new way to use the cooker for cooking

has lost much of its force. Instead of people standing around with open mouths watching it operate, they are more likely to point out to each other the weak points and the defects of the cleaner, or the demonstration.

Yet a vacuum cleaner is ideal for any air suction or blowing purposes around the home. If it is desired to blow the dust out of inaccessible places in a sewing machine, a typewriter or anything else, the vacuum cleaner can be brought into service. There are hundreds of different duties, not ordinarily

There is not an appliance sold that cannot be used for many purposes other than the ordinary ones. Finding and telling the people about these uses goes a long way toward selling them.

Soap and other manufacturers have found it profitable to find out the different ways people have used their products. When they have learned of these ways, they have in some cases changed their products to fit the odd uses better. In any case they have usually passed on the new and odd uses to the people. People will buy the product for the new and



Electrical expositions and electric home displays have done a great deal to increase the knowledge of the housewife in regard to what electric devices will do for her in her own home.

thought of in connection with the cleaner, that it can perform. Practical enthusiasm means searching out these ways and demonstrating them to customers. Doing this means an increased sale of cleaners.

The vacuum cleaner salesman who, when he enters the home to make a demonstration, instead of starting to clean the carpet—something that can be done with a hand carpet sweeper or suction cleaner—begins to clean the ceiling, extract the dust from behind the picture molding or does some other work to which the cleaner is admirably suited, stands a good chance to make a sale where he would not if he devoted his attention solely to the carpet. The chances are that the carpet has been cleaned repeatedly with a vacuum cleaner and that this demonstration has always failed to make a sale. A new use must be found before the sale can be made.

Give New Utility to the Product

If enough new decorative ways are found for using Christmas tree outfits and these ways are demonstrated, these outfits can be sold the year round, and as soon as they are made a year-round product a number of people, who will not buy them merely for Christmas use, will begin to spend their money for them. It is merely a matter of what we may call practical enthusiasm.

odd uses when they might not for the common, ordinary use. The same holds true with everything that is made. Some new and novel use, something a little out of the ordinary is always certain to make a strong sales appeal.

Odd Uses Increase Sales

It is exactly the same as in the case of the fireless cookers. One of the most important reasons why the store is so successful in selling them is because it features out-of-the-ordinary uses. The company is constantly searching for new ways of using cookers. No one can suggest any use to these people, that they do not test out and find out for themselves if it is practical.

The time and energy that have been used in this direction most certainly have not been lost. The sales record shows that. The work has been very largely a matter of having a little real enthusiasm for what is being sold. It has been a matter of not being satisfied with learning about new uses but of testing out their practicability and then passing on the results to the customers.

Exactly the same thing can be done in the sale of electrical appliances much more than it is now being done. The result is bound to bring a very material increase in sales, and will probably lower selling costs considerably.

ELECTRICITY IN INDUSTRY



By Louis F. Leurey
Industrial Electrical Engineer

Importance of Neatness in Industrial Electrical Applications

THE electrical profession generally and often inclusive of those actually engaged in industrial applications of electricity, does not possibly recognize the special importance of good appearance and neatness in the installation of electrical equipment and sources of electrical supply.

In recent years all of the broad-gaged managers of industrial establishments, and they now represent the large majority of the total group, have been

service may function 100 per cent effectively and still be an eyesore from the point of view of physical appearance. Again, looking at a switchboard from the sole point of engineering, it really represents nothing more than a device to divide a large block of power into smaller and more convenient blocks for distribution within the plant. To the owner, however, it represents an entirely different thing and to him it must replace the former engine room which was the pride of our industrial establishments in the days when mechanically driven plants were the rule, rather than the exception.

To the manager of the industrial plant the switchboard is the physical manifestation of his entire electrical motive system. The members of the electrical industry are overlooking a most serious and important policy when they do not capitalize the owner's interest and design and install for him a

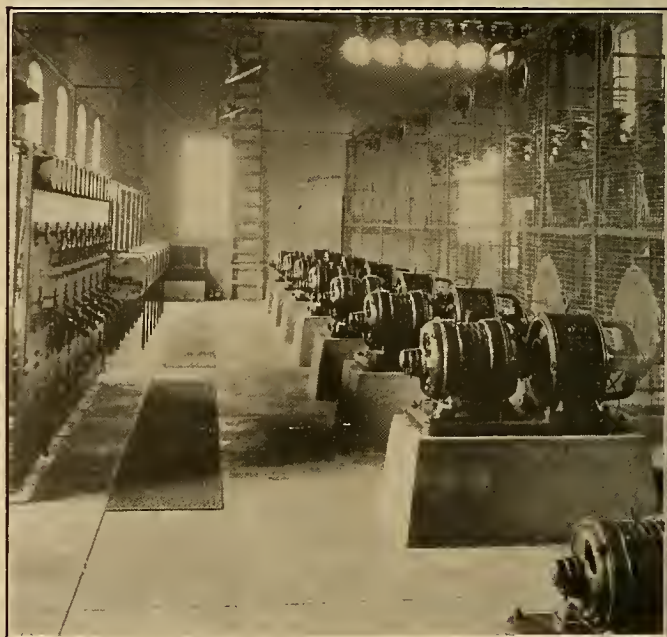


Switchboards similar to this are a credit to the industry.

more and more impressed with the value of architecture, correctness, cleanliness and all around neatness in the arrangement of their industrial plants. Many thousands of dollars have been spent by progressive firms on the Pacific Coast for the beautifying of their grounds, the handsome design of their buildings and the neat and sanitary arrangement of the interior of their plants.

It is to be regretted that the electrical industry has not in the majority of cases, fallen in step with this spirit of advance and it is to be noted that in many otherwise beautifully arranged industrial establishments, the electrical facilities stand out with a degree of bald ugliness which is not a credit to our industry.

From the purely utilitarian point of view of engineering necessity, a switchboard or a power



These motor-generators were installed for a smelter in the Northwest with a view to securing efficiency and neatness.

switchboard which is a source of pride, both to the manager and to the firms who design and install them.

It is indeed a sorry contrast in some industrial establishments to see the plumbing industry represented by beautifully arranged groupings of their appliances with a lavish use of marble and nickel

ware and to see in that same establishment a loose assortment of black metal cans mounted on a wooden frame and labeled "switchboard."

The electrical industry through all of its branches should take heed of this modern movement to beautify industrial establishments and see to it that electricity in all of its physical manifestations, through services, switchboards and equipments will be a credit to the industry, not only in effectiveness but in appearance as well.

Applications of the Electrical Oven in the Automobile Industry

AT THE plant of the Durant Motor Company in Oakland, Calif., there is now in operation one of the most advanced and important applications of electric energy to oven problems that has yet been installed in the West. At this plant there are now installed two three-compartment body ovens, one chassis oven and one parts oven, having a connected capacity of approximately 2,000 kw. All of these ovens are being used in the japanning and finishing of motor cars or their component parts.

The heating units are of General Electric Company manufacture and are installed in a number of standard sizes and temperature gradients to suit the various types of work which are handled in this installation. In the three-compartment ovens each compartment is divided into two independently controlled temperature zones so that a total of six independently controlled temperature zones are handled from separate electrical circuits. The approximate length of these oven tunnels is 250 ft. for each of the three compartments.

The accompanying photographs show the two ends of the three-compartment oven and a section of the control board from which the equipment is operated. Special automatic control provides for uniform temperatures and operation.

The parts oven is used largely for enameling sheet metal parts of the Durant and Star cars, this type of equipment being principally composed of hoods and fenders. This oven is of the continuous conveyor type upon which the parts are loaded and after being loaded are dipped into a first coat tank



Section of the control board at the Durant assembly plant, Oakland, Calif., showing curve-drawing recording instruments.

and are then taken up through the first coat oven and thoroughly dried, after which the parts again descend into a dip and in succession are taken through the second coat oven. One of the interesting and vital parts of this whole installation is the nicety of temperature control which gives the electric ovens their special commercial effectiveness.



The automobile bodies enter the three-compartment oven pictured at the left and are delivered from the other end of the machine, as may be seen in the right-hand illustration. Six temperatures are obtainable in this electrically heated oven.

JOBBER, DEALER AND SALES AGENT



Developing Business That Will Bring Repeat Orders

Commercial Illumination Offers Field from which All Branches of the Electrical Industry May Derive Profit

By REY E. CHATFIELD

Secretary-Manager, Electrical Service League of British Columbia

Securing business which calls for repeat orders or for similar orders from other sources is one of the sales problems met by the electrical contractor-dealer and all other men in the electrical industry. This form of business, which brings other business to the store, is the most desirable that can be obtained and it is the intention of every merchant to acquire it.

For the electrical contractor-dealer, show window lighting presents this opportunity, for once that a store in a business block is supplied with correct illumination, the other establishments to protect their business, install equally as attractive window lighting units. Getting the original foothold in the business district is the most difficult part of the sales program. In securing the first business for commercial lighting installation, cooperative effort will often prove to be to the advantage of all concerned, namely, contractor-dealer, central station, and manufacturer of lighting equipment.

Selling to the Industry

Unfortunately, electrical men must be sold the idea thoroughly first, before progress can be made. Ordinarily an electrical contractor or fixture dealer in selling fixtures and the necessary wiring installation for an illumination job sees only so much wire, pipe, etc., and so many fixtures, and he is apt to lose heart when the prospect questions price and the total runs into several hundred dollars. That man must firmly believe that he is not selling fixtures, but that he is selling publicity. Good illumination is cheap publicity. If the salesman can convince his prospect that the proposed illumination installation is permanent publicity, the cost of which is less than the monthly or annual appropriation for newspaper advertising, he should have no difficulty in making a sale. In order that a prospect may be convinced on this point the salesman, whether he be contractor or fixture dealer, must believe in it implicitly himself.

Having sold the electrical industry this idea the propaganda and details of the scheme are fairly simple. The Electrical Service League in its campaign mapped the retail business district and from the central station obtained a mailing list of every user of electricity in that district. Then a series of three letters were multi-graphed, addressed and signed as per-

sonal letters and sent out covering the retail district.

Letter No. 1

"MEN AND MOTHS ARE ATTRACTED BY LIGHT

"You don't care so much about the moths, but you depend upon the men and women you attract to your store to increase your daily receipts, turnover and success as a retail merchant.

"Light is the beacon—not necessarily more light but light properly applied. The average store keeper today is not getting the returns made possible through recent developments in the art of electric lighting. Yet there is no greater stimulus to action on the part of the buying public than a properly lighted store.

"Under the glow of correctly located lamps and fixtures your merchandise will present a greater appeal. More accurate inspection of intended purchasers will be possible and quicker decisions by the shopper will result.

"Proper lighting creates more satisfaction among new customers and strengthens the good-will of all your patrons.—Let us show you how to do it.

"Yours for better lighting,
"SECRETARY-MANAGER."

Five days later the second letter was sent out.

Letter No. 2

"WHY DO SUCCESSFUL MERCHANTS ADVERTISE?

"You don't have to guess the answer to that question—it is self-evident. Prospective customers read the advertisements—and become buyers.

"Do you realize that your show windows and the appearance of your store are worth more to you for publicity than pages of advertising? Newspaper advertising is read by about twenty-five per cent of the people who subscribe for or buy a newspaper. You can attract the attention of every passerby to your store if it is properly lighted.

"Do your windows give you full value as a proper medium for publicity? Have you made an attempt to find out? Fully fifty per cent of your sales to transient customers are made for you by your show windows.

"Our business is store and window illumination. Can we not make a survey of your store and advise you as to its proper illumination? Recently our illumination engineer found a business man on Granville Street using too much

current to obtain the intensity of light he wished. By the installation of a proper reflector he cut his consumption of energy in half and doubled the intensity of useful illumination.

"Perhaps your trouble is similar to the trouble of that merchant. We offer you this service free—if you are interested phone Sey. 5000 and ask for Mr. ———.

"Yours for better lighting,
"SECRETARY-MANAGER."

Then letter number 3 was mailed.

Letter No. 3

"Dear Sir:

"A few days ago we wrote you a little note stressing the value of proper lighting for your store and show windows. Since that time we have acquired the services of Mr. ———, an expert in store lighting.

"He will call on you some time during the week of ——— to discuss your lighting. Improved lighting does not necessarily mean more light, but proper direction, diffusion and color of light. Perhaps you are using too much light. If so he will advise you.

"If you are interested in the illumination of your store we will be glad to draw up specifications and make recommendations for proper illumination without charge.

"Yours for better lighting,
"SECRETARY-MANAGER."

Before the third letter was mailed the retail area was divided into small districts. Through the cooperation of the central station, jobbers and contractor-dealers, salesmen were loaned to make the necessary follow-up calls.

As the letters were mailed each salesman was notified to make his scheduled calls. This salesman when he found an interested prospect offered to have a proper layout drawn, free of charge. Through the cooperation of the central station these layouts were drawn by their illuminating engineer and furnished the campaign manager. These layouts were forwarded from the League office with a sales letter applying to the particular store under consideration and the interested contractor-dealers were then advised that a certain prospect was interested in lighting and that a layout had been drawn for him. Contractor-dealers then called on the prospect to close the job. In this way, where the prospective purchaser declared no preference as to contractor, he had several men urging him to make the new installation.

The campaign so far has covered five hundred stores in an area of thirty-six city blocks and has resulted in from one to three new installations per block with the probability of this number increasing greatly.

Selling the Electrical Idea to Power Company Employees

As a part of the "Electrify" movement which is being fostered by the Joint Committee for Business Development, employees of the Edison Electric Illuminating Company of Boston have organized an Electrify Club, membership in which depends upon the degree of electrification in the homes of the employees. There are five officers in the club, a president and four vice-presidents, and these are determined by the extent to which they have electrified their homes. There are no dues, meetings, or obligations of any kind.

Electrification is measured in terms of points, and only those having a rating of at least 80 points are admitted. The minimum was raised from 75 on Feb. 1. So many points are given for outlets, appliances, etc., and in order to give those living in small houses the same opportunity as those occupying larger quarters, the wiring points are credited on the real estate basis. All consumption outlets, save switch outlets, are termed "outlets" no matter where they are placed. A chandelier counts as one outlet, and so do convenience outlets, cellar lights, porch lights, hall lights, bell-ringing transformers, etc. Bathrooms, halls, cellars, closets, etc., do not count as rooms, but the outlets in these places are considered.

The points are arrived at in this manner:

Wiring: Add all outlets, giving each a value of one except duplex convenience outlets, which are counted as two; divide by the number of rooms and multiply by 10. Thus a seven-room house with 21 outlets would have 21 divided by 7, or three outlets per room, receiving a point score of 30.

Appliances: The following appliances are listed at one point each, and where there are two or more of any one kind, no more than two are counted. Buffer and grinding set, Christmas tree set, cigar lighter, coffee grinder, curling iron, egg mixer, electric fan, electric phonograph motor, electric player piano, glue pot, hair dryer, heating pad, sewing machine, soldering iron, vibrator, violet ray machine, and any other appliance consuming less than 300 watts and not included elsewhere in the list.

The following count two points each, not more than two being counted: chafing dish, egg boiler, immersion heater, grill, milk warmer, pressure cooker, samovar, shaving mug, toaster, waffle iron, and any other appliances taking more than 300 and not over 600 watts.

The following count as two points each, and as many as three may be in-

cluded: flatirons, radiators of the sun-beam type.

The following count as five points, and only one may be counted: electric ice cream freezer, electric fireless cooker.

Ten points are given for the following, and only one is to be counted: washing machine, vacuum cleaner, dish-washer, mangle with electric motor but not electrically heated.

The following count 20 points each and not more than one may be counted: electric range of over 1,000 watts, electric refrigerator, electric mangle with electric motor and electric heat.

The following count according to size: portable or table lamps, one point for each socket; electrically wired furniture, such as wired beds or tables, count one for each socket or convenience outlet.

Each month additional Boston Edison employees are enrolled in the club, and there is much enthusiasm shown by those who are anxious to join and those who want to see their point total grow larger. Increased sales of appliances to employees have resulted from the activity. The organizers of the club were L. R. Wallis, sales department; C. E. Greenwood, appliance department, and R. S. Hale, special research department.

ARE YOU ON YOUR KNEES?

By JOE OSIER

But recently, a friend of mine who, by the way, owns and conducts a small shop, specializing in appliances and fixtures, and—

Who works hours per day in order to keep the—

Celebrated wolf from the w.k. door—

Told me that he had despaired of ever becoming a coupon clipper—adding that he was ready to—

Toss in the towel, strap on his climbers and hike up the nearest pole.

He said: "I'm ready to concede that as an electrical contractor-dealer, I'm a fine hunk of Swiss. I'm a lame duck in the puddle. My chances for success can be compared to the chances of the—

"Tallow footed dog who chased the asbestos cat through the naughty word.

"My doom has been signed, sealed and delivered—the boys with the big shops and the elegant show windows saw to that and—

"All that remains for me to do is to take the air."

But before he started for his favorite corner where he was wont to put on the blubber act, I unleashed the following wise crack and he listened:

"The great only seem to us great because we are on our knees;

"Let us arise."

And further from me—"Rise, Brother

and do your stuff. You have been blinded by the brilliance diffused from your competitor's windows. His display has shot you for a row of convenience outlets and—

"You are looking for a soft spot to light.

"Don't walk out on the game. Take my hunch and follow his example. If he can pack in the cash customers and shake the shekels from their one way pockets through a flossy window and up-to-date merchandising methods, why can't you do likewise?

"Your competitor is gathering the glue because he is doing business in the latest approved style—he is making a play for it; in other words, his fast ball is hopping all the time while you—

"And there are hundreds like you—play the bench and wonder why the game cannot be won."

And so on—until I saw his mad a-coming and then I beat it but—

A few days later I walked by his place of business and I noticed a great change had taken place. The 1896 fixture had been taken out of the window—the pliers and roll of tape and the carton of bulbs were gone and in their places were tastefully displayed a few, fine fixtures and several appliances which—

According to a small card, cost but a few cents per day to operate.

Looking inside the door, believe it or not, I saw several customers and they were being separated from something which reminded me of money—and—

This sight prompted me to speak right out: "How's the battle today, friend?" and—

My friend came back with: "The battle has just started but it will be the decisive one in the long war which is raging.

"From now on you can count me in until I'm counted out.

"The fodder is on me, come Tuesday noon."

Electrifying the Merchandising Figure of the Dealer

An electric light bulb is not so unlike a human head in shape—why could not a clever window display be made by painting eyes and nose upon some of them, arranging a body effect and show the bulbs (or these little figures) engaged in the household tasks that can be performed by electricity.

This is suggested by the heading drawn by a newspaper artist in Columbus, Ohio, in connection with a Sunday issue about the time an electrical show was held there recently. He drew little figures using bulbs for heads,—one sweeping, another cooking, one making coffee, another washing and still another doing the ironing.



Section heading which appeared in a Columbus, Ohio, newspaper the Sunday before the opening of the Electric Show.

Make It Easy for Prospects to Become Customers

During Sale Southern Electrical Company Accepts One Dollar as Initial Payment on Any Electric Appliance

"Make it easy for prospects to become customers" has long been one of the slogans of successful mail order houses. These firms have appreciated the value of the coupon attached to an advertisement and have been consistent users of this type of "action getter." Mail order houses usually stipulate that in using these coupons only a small initial payment, or quite often no payment, is required to secure delivery of the merchandise.

In mail order advertising, the copy is designed to first attract the attention of the reader, then interest him in the merchandise being advertised and finally the effort is made to create the desire for ownership in the mind of the prospect. After this desire is created the advertisement presents the "dotted line" upon which the reader who has been imbued with the desire of ownership can sign his name to secure the merchandise.

One of the reasons for the success of the mail order houses is the fact that they have made it easy for the prospect to buy, through their policy of supplying the coupon blank at the psychological moment. The prospect in secur-

chase is made. Thus the installment business has been found to be a profitable one for the merchandiser as it increases his yearly turnover. In addition, he secures a fair rate of return on the money tied up in merchandise which is covered by installment purchase contracts. If he carries these contracts himself, he usually secures interest in excess of seven per cent. If he sells these contracts to contract purchasing concerns he may still make a small profit on the discounting of the contracts.

The added turnover is the most important consideration, and it is principally because of this that the electrical dealer is interested in installment business. By offering electrical devices to prospective buyers for the payment of a small initial sum, which is to be followed by weekly payments arranged to suit the customer's circumstances, the dealer can greatly increase his business.

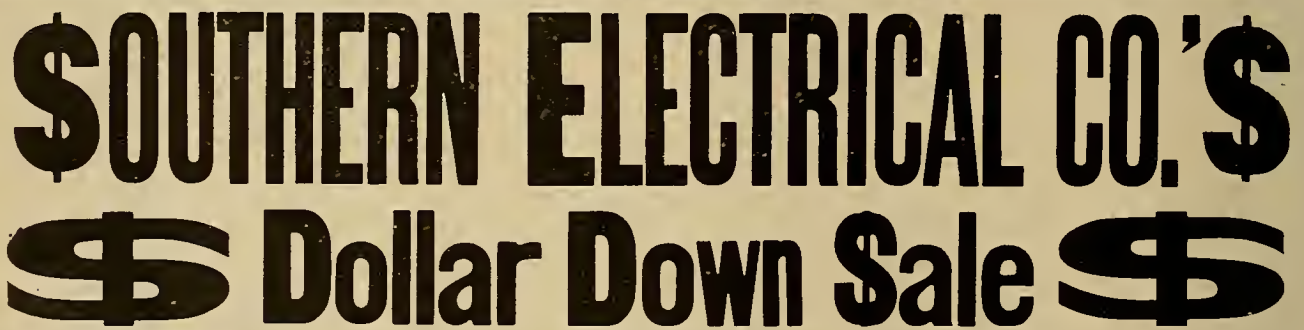
An example of how low the initial payments can be made, is given by the Southern Electrical Company of San Diego, Calif. That firm desired to make it extremely easy for the women of the city to install electric labor-

tures of the "Dollar Down Sale," as it was called, were explained to the public and full details as to how purchases could be made with only one dollar. The advertisements also contained illustrations of the devices that the company handled.

Posters in two colors were also distributed around the city. These were in various sizes. Some were located on billboards, smaller ones being used as windshield stickers. The billboards used were situated at strategic positions around San Diego within a radius of ten miles.

The special sale campaign is not new to the Southern Electrical Company, for it is the policy of the management to conduct sales based upon new ideas several times throughout the year. The poster idea has been found to be very effective and every campaign is heralded by some form of poster. To make the needed variety in these posters the company selects different color schemes for each set of posters. In the "Dollar Down Sale" the posters appeared in blue and red on a white background. By the use of several colors in its posters the company is able to secure variety of treatment and also to attract more attention to the posters than it could, if it used only one color of ink.

Experience has shown that to make any sales campaign of real value to the



The automobile windshield sticker, reproduced above, was printed in blue and red, thus carrying out the color scheme used in the campaign.

ing the merchandise by sending either no money or only a small sum when the order is placed, pays the balance when the goods are delivered.

The electrical merchant, though usually not in a position to present coupons to prospects, can nevertheless make it easy for the prospect to become a customer, for he can offer low initial payments on his merchandise. In this respect he has the advantage over the mail order house, for he can spread the balance of the payments over a period of months thus giving the purchaser the advantage of the use of the appliance before the entire purchase price has been paid. The inducement of the low initial payment is often enough to complete the sale, in cases where it could not be done otherwise.

Electrical dealers and other merchandisers have found that a sale is made more easily if the first payment on the goods is not the full amount. The average purchaser would rather make a small down-payment and settle for the balance in monthly installments, for in many cases the full purchase price is not available at the time that the pur-

savers and to do this inaugurated a campaign, whereby any electric device in the stock carried by the company could be secured by making a down-payment of one dollar. The plan of the campaign was to secure as many sales as possible by the policy of taking the extremely small initial payment for the delivery of any piece of equipment to the home of the purchaser.

To make this campaign a success, it was necessary to make a great number of sales. The Southern Electrical Company decided that, to secure the volume of sales necessary to insure the success of the idea, a considerable amount of advertising would be necessary. In planning this advertising several different forms were considered to be necessary. The values of the several forms of advertising which could be used by the company were considered and as a result it was decided to concentrate upon newspaper and poster advertising.

In preparation for the sales drive, large-sized display advertisements were run in the San Diego papers announcing the new payment plan. The fea-

firm, adequate advertising must precede the dates of the sale by several days. By advertising, the electrical merchant secures the interest in his products that is necessary before the desire for ownership can be created in the minds of his prospects. When desire of ownership has been aroused before the opening of the sale, so that the prospect will come to the dealer's store for a demonstration, only the sale-closing arguments are left to make the prospect a customer. Here the dealer who has provided the small-initial-payment-plan of selling his stock, presents the coupon with the dotted line that the mail order house presents to readers of its advertisements. The electrical dealer has the advantage over the mail order house for the salesman can add the weight of his personality in making the sale.

The low initial payment is the largest inducement to the buyer, because in the "Pay-as-you-use-plan" the customer is permitted to have the equipment installed in her home while a large part of the purchase price remains unpaid. The small extra charge for this method of paying for the equipment will not

"Where Better Electrical Appliances Are Sold"



Eden

America's foremost cylinder-type Electric Clothes Washer.

Terms to Suit



The HOOVER

Over a Million Satisfied Users.



SIMPLEX IRONER

"THE BEST IRONER" Recommended by Every User.



Free-Westinghouse

The Outstanding Electric Sewing Machine on the market today.

Dollar Down Sale

For a Limited Time Only
One Dollar Down Places
Any Household Electrical
Appliance in Our Stock
In Your Own Home
The Balance in Easy
Weekly Payments

AGAIN we are giving you the opportunity to enjoy the help of modern electrical household appliances by paying only \$1.00 at the time of purchase. Arrange the balance in convenient weekly payments. At the Southern Electrical Co. stores you can

Choose from the Best Lines of Household Labor Savers Manufactured

Besides, you have the advantage of a never ceasing service rendered by a concern of known reliability. Don't delay—Pay \$1.00 tomorrow!



End and E
7th and Broadway
Main 4730



Maytag
Gyrafoam
Washer

Cleans by Gyrating Currents and Soapy Suds.



EUREKA

Six Times the Grand Prize Winner.



UTENCO IRONER

The new smaller ironer that can be put in a closet.



Gainaday
OSCILLATOR

sumer booklet that can be used by contractors who desire to mail booklets to home lighting prospects. The title of the new monograph, which is a companion piece to "Building Residence

Sweep no more
my lady~



The electric cleaner booklet has this cover design.

Lighting Business," is "Interior Sunshine." The new booklet consists of twelve pages, eight of which are devoted to the story of a well lighted



Cover design of "Interior Sunshine."

Newspaper advertisements similar to this were placed in the San Diego papers prior to the day of the "Dollar Down Sale." The company figured that every reader was a prospective customer.

prove to be a stumbling-block to the prospect who has the desire for ownership, in fact, the use of the purchase before it is fully paid for, will more than make up for this extra charge which must be made for buying the merchandise on the installment plan.

The installment plan has been found to be one which is a large sale-producer and one which is highly remunerative to the dealer. In the majority of cases it has been found that purchasers are prompt and honest in their payments. The sale of goods must, of course, be backed by a contract and promissory note to protect both parties. Conditions under which the firm is operating, as has been mentioned, will determine whether the dealer should hold this paper or discount it with a concern operating for that purpose.

Development Society Publishes Illustrated Monographs

Because the electric cleaner is selling at the rate of hundreds of thousands a year and because the spring cleaning time is the best time to start an intensive cleaner campaign, The Society for Electrical Development in conjunction with the Joint Committee for Business Development, has recently produced an 8-page illustrated booklet on cleaning electrically. The new booklet is entitled "Sweep No More My Lady." It tells the story of electric cleaning in an entertaining style and will make a suitable mailing piece for use by manufacturers, jobbers, dealers and central stations having retail departments.

The Society for Electrical Development has also recently published a con-

home and the other four giving concrete suggestions for the correct lighting of various rooms.

Descriptive booklets containing illustrations have been found to be material aids to the electrical merchant when putting on either intensive campaigns to move his stock or when he desires to keep up a steady flow of literature to his mailing list. The cost of these booklets has often precluded their use by the electrical dealer, who considers that the expense of making up a booklet of his own will not be justified. When a large number of these pieces of literature are prepared the cost per unit is materially reduced. It is for this reason that national associations of the electrical industry have gone into the field of developing them. In these booklets the publishers make an effort to have the editorial matter of use in any part of the country and have greatly aided the industry.



On the closing day more than 2,000 visitors were turned away from the "Dream Bungalow" which was displayed in Pueblo during March.

6,000 People Visit "Dream Bungalow" in Pueblo

Success of Five Day Exhibit Induces Electrical Interests to Plan
Electrical Home Display for Early Summer

Six thousand visitors were given a glimpse of what electricity will do to modernize the home when a "Dream Bungalow" was recently displayed at Pueblo, Colo. The home was open from March 14 to 18 and on the last day 2,000 people were turned away.

According to E. F. Stone, superintendent of the Colorado Power Company, the "Dream Bungalow" was not primarily intended for an electrical home, but when the opportunity presented itself for the development of electrical features, his company got behind the movement in cooperation with the Kyle Electric Company, which installed the fixtures.

Attention of the public was directed

to the importance of proper illumination in the home by means of the attractive lighting fixtures which were installed. Convenience outlets were emphasized. In every case proper appliances were connected to the convenience outlets. The house, a five-room bungalow, was also wired for an electric range.

Cooperative advertising in the daily newspapers was the only form of publicity used to direct public attention to the home. All advertising was financed by Harry O. Schmidt, the builder, Calkins-White Bros. Furniture Company, who furnished the home, Robert Innes, a decorator, and the electrical interests. It was largely through word of mouth that visitors were attracted

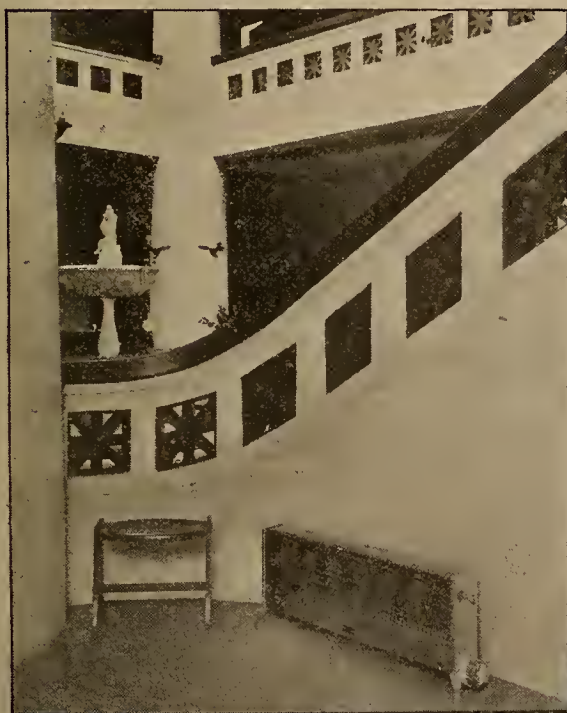
to the display. It is estimated that thousands of additional visitors could have been shown through the home had the showing lasted longer and had more advertising been done.

Because of the success of the home in spite of the short duration of the display, plans are now being made to feature an ideal electrical home during the summer months with the aid of the Denver Electrical Cooperative League.

From present indications, electrical home activities in the West during 1923 will include many localities where homes have not been shown in the past. Homes displayed by the electrical interests have met with such a marked degree of success that contractors, subdividers and real estate firms have adopted the idea as a means of bringing to the attention of the public the desirability of owning a home in the particular tract which they are developing.



The home was completely wired, with plenty of convenience outlets and adequate facilities for an electric range. The importance of proper illumination was particularly emphasized.



WHILE electric heat has been applied to apartment houses and homes in various sections of the West with marked success, few tests as to its practicability for schools and offices have been made. A 57.2-kw. installation at the Williams Institute, a high class private school in Berkeley, Calif., after four months of operation, has proved that electric heat is both efficient and economical for heating a structure of this type.



THE electric heaters displaced steam equipment and were not installed until a careful study had been made of all available classes of heating. The consumption of electricity during January and February, 1923, the two most severe months of the year, was 4,900 kw-hr. and 5,400 kw-hr. respectively. The installation includes two 6,000-watt heaters, one 5,000-watt, six 4,200-watt, three 3,300-watt and two 2,500-watt units.

INDUSTRIAL NEWS



Pacific Electric Plans to Build Subway in Los Angeles

Construction work on a subway tunnel that will run from the Hill Street station of the Pacific Electric Railway in Los Angeles, Calif., to carry electric cars under the congested section of the city, will start in sixty days, according to D. W. Pontius, vice-president and general manager of the company. Mr. Pontius stated that the tunnel should be in operation within fifteen months after the bore is started.

It is the intention of the railway company to route most of the Hollywood, Glendale, and San Fernando cars through the tube when it is completed. If this is done it will relieve congestion on Hill Street and Sixth Street materially as these cars are all routed on these streets at present.

The tunnel will cost in the neighborhood of \$3,000,000, according to figures given out by the general manager of the railway.

The Pacific Electric Railway and the Los Angeles Railway Company have agreed to install cross-town bus service lines, which would take transfers from either line, if they are given a permit to operate these bus lines. Transfers between the lines themselves, to permit persons living on the lines of the one to transfer to cars of the other company will not be issued at the present time. The city has asked this, but the companies have requested that the universal transfer system be withheld for the present.

The Pacific Electric has notified the city of its willingness to extend its Bunker Hill subway to Pershing Square if the city council will grant it permission to construct a station under Pershing Square that passengers may alight there after arriving in the city through the tunnel. To grant the company this right, the city council will have to order an election to change the city charter which does not provide for the granting of the permission requested. The charter now only gives the council the right to grant right-of-way under parks. The charter amendment may be placed before the voters at the May 1 primaries or at the city election on June 5.

Final Idaho Power Rate Hearing to Be Opened April 30

The hearing for the purpose of fixing the rates to be charged by the Idaho Power Company will be held in Boise, Idaho, on April 30. The fixing of the valuation upon which the company should receive a fair rate of return has been before the Idaho Public Utilities Commission since April, 1920.

The valuation of the company's property used and usable in the public service as of Dec. 31, 1919, was decided upon and now the hearing is to bring this figure up to date. The Southern Idaho Electric Light & Power Users' Association, an organization of towns and cities of southern Idaho, has been opposing the company's claim for valuation.

At the close of the hearing that is to open April 30, the commission will issue an order fixing the rates for all classes of service. It will probably take two or three months before this order is prepared.

Bids for Modesto Distribution to Be Opened May 2

Sealed proposals for the construction of approximately 40 miles of 11-kv. distribution line will be opened by the Modesto Irrigation District at Modesto, Calif., on May 2, 1923. The line will be used for the distribution of the power from Don Pedro Dam on the Tuolumne River. Specifications for the following eight schedules of materials will be furnished upon application accompanied by a check for \$5. The schedules follow:

- Schedule 1. 900 butt-treated poles.
- Schedule 2. 2,150 crossarms.
- Schedule 3. Hardware for approximately 40 miles of line.
- Schedule 4. Metal and wood pins, 2,300 and 2,500 respectively.
- Schedule 5. 4,250 insulators.
- Schedule 6. Copper wire, 139,500 lb.
- Schedule 7. Nine 11-kv., three-pole switches.
- Schedule 8. Four 1,000-kva. and six 150-kva. transformers.

Bidders may submit bids upon either or all of the schedules, but no proposal will be considered for a part of any proposal.

Railroad Seeks Permit to Build Cutoff 118 Miles Long

Formal application has been made to the Interstate Commerce Commission in Washington, D. C., by the Central Pacific Railroad, to construct 118 miles of railroad between Oak Ridge and Kirk, both in Oregon, the first being in Lane County. The new line, designated as the Natron cutoff, is expected to cost approximately \$10,000,000.

Construction will enable the Central Pacific and the Southern Pacific systems to gain direct access to the Willamette Valley and to Portland and will provide an alternative route for interstate traffic between Springfield and Junction, and Weed, northern California. The territory to be tapped by the road has extensive timber resources and much agricultural land.

Six Applicants Request Water for Power Development

The Department of Public Works of the State of California received six applications for permits to appropriate water for power purposes during the month of March. The largest project is that of Ray L. Allin, Sacramento, whose petition asks for a permit to appropriate 1,625 sec.-ft. and 1,365,000 acre-feet per annum from Clear Lake and the North Fork of Cache Creek, the water to be taken in Lake County. Mr. Allin proposes to develop 228,000 hp. and will construct 21 miles of conduit and 16 miles of pipe line.

The Modesto Irrigation District has applied for a permit to appropriate 1,500 sec.-ft. and 150,000 acre-feet per annum from the Tuolumne River in Stanislaus County. The district proposes to develop 17,000 hp. at an estimated cost of \$360,000. The other applications are for small projects affecting only local areas.

During March the Division of Water Rights issued three permits for the appropriation of water for power purposes. Roy H. Elliott, Hobart Building, San Francisco, has been given permit to appropriate 10,000 acre-feet per year from the North Yuba River in Yuba County. Mr. Elliott proposes to develop 20,682 hp. at an estimated cost of \$1,500,000.

Power Possibilities of Marion Lake Told Salem Men

The power possibilities of Marion Lake, a body of water located in the eastern part of Marion County, Oregon, were told recently at a meeting of Salem, Ore., business men by J. G. Kelly, an engineer of Portland. From Mr. Kelly's figures it appears that 18,000 hp. can be delivered in Salem at a total cost of \$90 per hp. of capacity.

The plan proposes a low dam, forming a reservoir containing 10,000 acre-feet, conducting 160 sec.-ft. of water through a 66-in. wood-stave pipe, 4 miles in length, and obtaining a total head of 1,455 ft. at the power house. A 66-mile transmission line would be needed to reach Salem.

The Pelton Water Wheel Company of San Francisco has shipped a 57-in. needle valve to operate under a head of 680 ft. at the San Francisquito No. 1 plant of the City of Los Angeles, on the aqueduct near Saugus, Calif. This is part of the equipment required in connection with an 18,000-hp. double overhung impulse unit now nearly completed at the Pelton shops, and which will be the fourth Pelton turbine of this size installed at that plant.



Right-of-way of the new Puget Sound to central Washington transmission line, looking down from the summit of the Wenatchee Mountains. The line is being built across two high mountain ranges.

Power Line Is Being Built Over Two Mountain Ranges

The first commercial power line ever built in the Northwest to cross two mountain ranges is under construction by the Puget Sound Power & Light Company. The line will transmit 27,000 hp. from the Puget Sound country into central Washington. The line is 120 miles long, and will represent an expenditure of approximately \$1,000,000. Electrical energy will be transmitted at 110,000 volts.

The line starts at the White River plant of the company, uses the Northern Pacific right-of-way from Green River Gorge over the Cascade Mountains, to the mouth of Tenaway, south-east of Cle Elum, crosses the Kittitas Valley to a point due north of Ellensburg, and thence northerly to Wenatchee, crossing the Wenatchee Mountains west of Colockum Pass, at an elevation of 5,800 ft.

The installation is the three-phase type, and in the construction more than 825,000 lb. of copper cable will be used. Crossing the Wenatchee and Cascade mountain ranges, 100 steel towers are to be employed. On other sections of the line two-pole towers, for balance of construction, will be set, using 55-ft. cedar poles, all heavily anchored.

The construction of the line presages a tremendous development in the Wenatchee and adjacent valleys east of the Cascades, which have long been under a handicap through lack of power. The capacity of the line will be considerably greater than present needs require, but future development is expected to catch up with the power offered. Gold mining in the Cascades and Wenatchee Mountains will be greatly facilitated, as will coal mining in these regions.

Single-Phase Transformers for Eagle Rock Completed

Six of the largest single-phase auto transformers ever built have recently been completed for the Southern California Edison Company by the Westinghouse Electric & Manufacturing Company. The transformers are for outdoor service and have been installed at the Eagle Rock substation of the power company.

The transformers will step the 220,000-volt current from the Big Creek transmission lines down to 150,000

volts so that the present equipment in the Eagle Rock substation can handle it without changing the installation.

The transformers are of the water-cooled type and will form a part of the largest 220,000-volt power system in the world. Each unit is rated at 36,700 kva., 50 cycles, giving a bank capacity of over 100,000 kva. A tertiary winding, connected in delta, is supplied for suppressing third harmonics in the voltage wave.

The transformers are of the shell type and are designed to withstand, without injury, mechanical stresses, due to short circuits when unlimited power is supplied at the terminals. The total weight of each transformer is 90 tons.

Preliminary Surveys for Idaho Plant Are Completed

The Grangeville Light & Power Company of Spokane, Wash., has recently completed preliminary surveys for a new power plant on the North Fork of the Clearwater River, near Orofino, Idaho. Two power sites, three-quarters of a mile apart, are being investigated and during the low water season the company plans to use a diamond drill to determine the character of the river bed.

W. C. Sivyer, president of the company, has stated that it is possible to develop 10,000 hp. at the site. The new plant is contemplated to care for an expected growth in demand for power in the district. The company now has a plant on the South Fork of the Clearwater River.

A new 8,500-hp. impulse wheel for the Electro Power House of the Pacific Gas & Electric Company has just been shipped to the plant by the Pelton Water Wheel Company of San Francisco. The wheel will drive No. 6 generator at the Electro plant and will replace an obsolete wheel of the Pelton type that was built in 1904.

Two booklets on patents and trade marks have been prepared, for free distribution to persons interested in these legal questions, by Richards & Geier, patent and trade mark attorneys of New York City. The booklets explain in layman's language the legal aspects of these two types of manufacturer's protection.

New Financing Company Formed to Handle Western Business

After approximately four years of successful operation in the West, the Republic Finance & Investment Company of Indianapolis, has announced its intention of organizing a California corporation for the purpose of handling the business formerly conducted by the western offices of the eastern company. The new concern will be known as the Republic Company and will have its headquarters in San Francisco.

The new company is being organized as a result of the success which the parent organization has met in its operation in the West. Performing, as it does, a valuable service to the electrical industry in acting as bankers and financial consultants to the merchandising branch of the industry, the company has merited the support which it has received. During the past three years the organization has transacted more than \$3,000,000 worth of business and the estimated transactions for 1923 are \$2,000,000.

Head offices are maintained in San Francisco with a branch office in Los Angeles. The new company will cover the entire West as far east as Denver. Plans are under way for the establishment of offices in the Northwest in the near future.

The present officers of the California organization are Wesley E. Shea, president; C. Wilbur Fritz, vice-president, and Leo M. Rappaport, treasurer. Mr. Shea is president of the Indianapolis company. Mr. Fritz will be in charge of the activities of the western company.

Additional Service to Be Given Workmen at Steel Plant

Addition of new trains that will provide for workmen employed at the Columbia Steel Company's plant at Iron-ton, Utah, has been made by the Salt Lake & Utah Railroad, an electric inter-urban operating between Salt Lake City and Payson, Utah. The service will be offered principally between Provo and Iron-ton and Springville and Iron-ton.

The road has taken steps to change the name of Crandall, its station between Infirmary and Fishatch to Iron-ton, the official name given the new industrial town by the Columbia company and Utah County officials.

The Water and Light Department of the City of Casa Grande, Ariz., is installing a 100-hp. Diesel engine to drive a 70-kva. generator. The district has been surveyed for hydroelectric power to be obtained from the Roosevelt Dam and an election on a bond issue will be held in May. If the bonds are voted for at the election, power will be purchased from the Salt River Valley Water Users' Association, which will operate the plant at the dam.

Construction on the 66,000-volt transmission line of the Beaverhead Transmission Company from Sheridan to Dillon, Mont., will be started within the next sixty days. The line will be 30 miles long and will carry power from the Montana Power Company to Dillon where it will be purchased by the Universal Electric Company who will distribute the power in Dillon.

Three Electrically Driven Boats Are Given Trials

First Electric Tanker in World and First Turbo-Electric Ferry Boat Arouse Interest in Pacific Coast Marine Circles

Interest in electric marine propulsion has centered on the Pacific Coast during the past two weeks where three electrically driven vessels were given initial trials. The trio consisted of the "Standard Service," the first electrically propelled tanker in the world, the "Hayward," the first turbo-electric ferry boat in the world, and the "Golden West," a Diesel-electric ferry boat.

The "Standard Service" was built at the Union Plant of the Bethlehem Shipbuilding Corporation for the Standard Oil Company of California. It is a barge tanker of approximately 3,000 gross tons and will be used in Alaskan service. Its equipment includes two 750-hp. Pacific Diesel engines, two General Electric marine-type generators and two G-E marine-type motors connected to the same propeller shaft. Other electrical equipment on the vessel includes Allan-Cunningham electrically operated steering equipment and cargo winches and electrically driven cargo pumps.

The ferry boat "Hayward" was built at San Pedro by the Los Angeles Shipbuilding & Drydock Corporation for the San Francisco-Oakland Terminal Railways for operation on San Francisco Bay. While Diesel electric drive has already been applied to craft of this type, this vessel is the first ferry boat in the world to have turbo-electric equipment. The propelling equipment consists of a Curtis turbo-generator set, rated at 1,100 kw. with direct connected exciter. Each of the two propellers is driven by a 1,200-hp. General Electric marine-type motor.

The propelling equipment is controlled from the engine room and the control is such that when the speed of the driving motor is furnishing all the power through the aft propeller, the speed of the forward motor will be so regulated that it will revolve only fast enough to relieve the drag or resistance of the forward, or idling propeller.

This arrangement for steam ferry boat purposes is a complete departure from that heretofore used. In vessels equipped with reciprocating engines a continuous shaft passes through the en-

tire length of the vessel, with propellers at each end operating at the same speed. The use of two motors on independent shafts means saving in fuel, increased speed, greater maneuvering flexibility, reliability of action and absence of vibrations.

Each boat carries two 35-kw., direct current, turbine-driven generating sets, which supply power for lighting purposes and operating the steering gear, ventilating motors and all other electrically operated machinery, when the main unit is shut down.

The ferry boat "Golden West" is a sister ship to the "Golden Gate" which has been operated on San Francisco Bay by the Golden Gate Ferry Company. Its propulsion equipment consists of two Pacific Diesel engines connected to two General Electric generators and two marine-type General Electric motors, one for each propeller.

Year Book Issued by Engineering Standards Committee

The 1923 Year Book of the American Engineering Standards Committee, which has just come off the press, shows that great progress has been made during the last year in standardization projects affecting electrical industries. Of the thirty-five standards thus far approved by the American Engineering Standards Committee, the following three are of special interest to the electrical industries: the National Electrical Code, the Electrical Safety Code and the Code for Electricity Meters.

The report shows that at the end of the year a total of 121 industrial standardization projects were definitely under way or had been completed and the standards approved. Of the projects which have reached an official status, fifteen have to do with electrical engineering; twenty-three with mechanical engineering; twenty-one with civil engineering and the building trades; three with automotive subjects; twelve with transport; one with ships and their machinery; fifteen with ferrous metals; four with non-ferrous metals; twelve with chemical subjects; two with textiles; four with mining; and nine pro-

jects with topics of a miscellaneous or general character.

Two hundred and seventy-five national bodies—technical, industrial and governmental—are now cooperating in the work of the American Engineering Standards Committee through officially accredited representatives, and more than nine hundred individuals are serving on the sectional committees which carry on the actual standardization work, the committee acting only as an administrative body.

Decision Handed Down in Johnson Valve Patent Suit

A patent suit relative to the manufacture of Johnson valves by the Wellman-Seaver-Morgan Company has been decided in favor of the William Cramp & Son Ship & Engine Building Company, according to reports which have been received from the East. Johnson valves were originally manufactured by the Wellman-Seaver-Morgan Company under a contract with the inventor.

Following the discontinuance of the contract and at the time the manufacturing rights for Johnson valves were acquired by the Cramp interests, the Wellman-Seaver-Morgan Company entered into the construction of a similar type of valve of its own design. The result was a conflict of patent rights involving the basic design of the Johnson valve, which was made the subject of litigation, terminated as mentioned above.

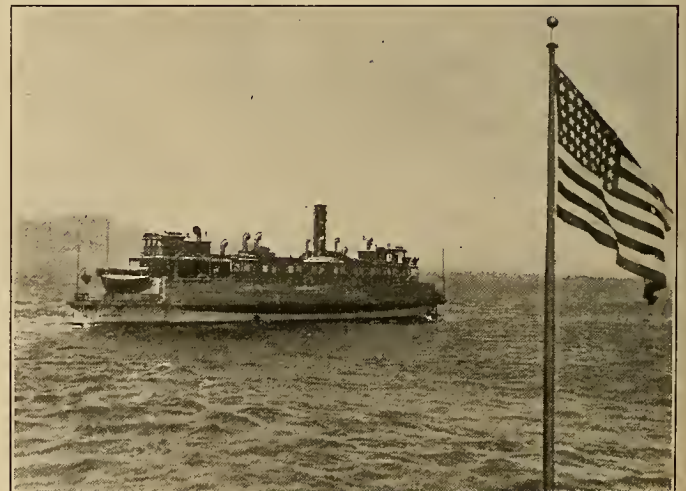
Two Applications Are Filed for Washington Water Rights

The Washington State Hydraulics Division recently received an application from Sterling B. Hill for a permit to divert 1,000 sec.-ft. of water from the South Fork of the Nooksack River. Mr. Hill contemplates the erection of a large hydroelectric power plant and intends to spend in the neighborhood of \$2,000,000.

Mr. Hill has also made application for permission to divert 200 sec.-ft. from Whatcom Creek where he plans to erect a \$400,000 hydroelectric plant. In addition to this the applicant intends to develop storage amounting to 65,000 acre-feet in Lake Whatcom. This water will also be used for power generating purposes.



Looking forward from the bridge on the "Standard Service," the first electrically driven tanker in the world.



The turbo-electric ferry boat "Hayward" coming into the Golden Gate after a successful trip from San Pedro.

Transmission of Power Started by Turlock District

The first unit of the Don Pedro Power house of the Turlock Irrigation District has been put into service and electricity was transmitted from the power house to the substation, about one-half mile from Turlock, Calif., on April 1. The current that was transmitted was used for drying out transformers in the substation and was not distributed to consumers.

The Delhi section of the Turlock district will be the first to receive power from the new project and engineers on the job report that all three units will be in operation supplying this section before the end of the month. There are now 30 miles of distribution line in the district and more will be added as soon as the work can be completed. The main transmission line is 33 miles long.

The irrigation district has sold electric ranges valued at approximately \$20,000 to residents of the section first to receive power from the Don Pedro power house. This section represents only a small part of the Turlock district.

Electrical Spectacle Planned for Denver Exposition

Members of the electrical industry in Denver, Colo., have taken preliminary steps in arranging for a spectacular electrical display at the Pageant of Progress to be held in that city in July. William D'Arcy Ryan, head of the illuminating laboratories of the General Electric Company, arrived in Denver recently to advise the local electrical men concerning the staging of an electrical spectacle at the pageant.

The Denver Electrical Cooperative League will handle the electrical end of the pageant and all of the electrical men in the city will work through the league. The plans at present call for an iridescent color scheme of illumination throughout the exposition grounds. Mr. Ryan has offered his services in aiding the electrical men in illuminating the grounds and the spectacle itself.

Customer Ownership Campaign Is Started by Seattle Company

According to a recent announcement made by A. W. Leonard, president of the Puget Sound Power & Light Company, Seattle, Wash., plans for the marketing of the company's securities have been perfected through the organization of the Puget Sound Power & Light Securities Company. The new company will handle all securities of the parent corporation.

The first offering to the public is a block of preferred cumulative stock yielding approximately $7\frac{1}{4}$ per cent at the present market price.

"The newly organized securities company now handles and markets all the securities of the parent company," said President Leonard in speaking of the new plan. "Every employee of the power and light company becomes an agent for these securities and every office of the company and its subsidiaries is a place where the public may purchase them.

"We have made this arrangement largely because of the desire of the company, as well as many people in the Pacific Northwest, to have the public in this part of the country share in

the earnings of the electrical development of this region.

"In the rapidly developing territory this company serves—including 247 cities, towns and communities from northern Oregon to the Canadian line in western and central Washington—the need is constant for extensions and improvements. In the Pacific Northwest is one-sixth of the hydroelectric power of the United States which we believe should be developed as fast as markets for it are obtained. This development means increased payrolls and the opening of larger and larger areas for agricultural uses, but over-development is economically unsound.

"Construction of new plants and extension of lines all mean the expenditure of new capital. It is estimated that our company will spend more than \$4,000,000 on extensions and expansions in the Pacific Northwest this year.

"This constructive use of capital creates securities to meet every requirement of the careful investor. Already upwards of 25,000 persons own securities of this company. But we want more people in the territory we serve to become partners in the company. This we believe to be practical 'public ownership.'"

The Puget Sound Power & Light Securities Company has its headquarters in the Stuart Building, Seattle. The officers are: A. W. Leonard, president; W. H. McGrath, vice-president; Frank Dabney, manager; F. W. Brownell, treasurer; James B. Howe, secretary; Dwight Ware, sales manager; and Roger S. Clapp, assistant treasurer.

Los Angeles Railway Orders Ten Electric Locomotives

To increase its facilities for handling freight, the Pacific Electric Railway of Los Angeles, Calif., has recently placed an order for ten electric freight locomotives. The locomotives are to be of the sixty-ton type and will cost \$475,000. Two are to be delivered in the next sixty days.

The Pacific Electric now has forty-three electric locomotives in its freight service and the new locomotives, capable of hauling fifty loaded cars on level track, will greatly speed up the service. The new locomotives were ordered because of the increasing demands made upon the tractive power of the road by the heavy freight coming from Los Angeles harbor.

Transmission Lines Authorized by Modesto Directors

Directors of the Modesto Irrigation District in a meeting held at Modesto, Calif., recently, passed a resolution which is the first step toward permitting the district to erect its own power lines. The resolution permits the construction of lines leading from pumping stations to the nearest power lines of the Pacific Gas & Electric Company. The resolution was passed for the purpose of eliminating long contracts demanded by the power company.

The power company will not furnish transformers and other connections in delivering power to pumping plants unless contracts of long duration are signed. The district is not willing to sign any long-time contracts with the power company.

To Rebuild Transmission Lines in Northern California

Thirty-six miles of transmission line in Siskiyou County, California, will be changed from 34,000-volt capacity to handle 60,000 volts, in the near future, according to reports from The California Oregon Power Company. This company has ordered the materials and in a short time will start the reconstruction of the line.

The portion of the company's line to be changed over to 60,000-volt operation is that between Fall Creek and Yreka. This includes the tap line extending down to Hornbrook. The increasing demands for power in Yreka and at other points along the line have made the change necessary.

The present line, which will be salvaged, was built in 1903. New poles and line equipment will be used and in many places new right-of-way will be used in order to make patrolling of the line easier.

The portion of the line between Yreka and Montague will remain at 34,000 volts. Other transmission line work will include the repairing of the line from Yreka to Indian Creek.

To handle the higher voltage to be used on the Yreka-Fall Creek line, the substations at Fall Creek and Montague will be rearranged to provide for 60,000-volt service. This will not be done until the change in transmission line has been completed.

Lumber Company Places Contract for Large Power House

The contract for the construction of the Long-Bell Lumber Company's power plant at Kelso, Wash., was awarded to the Charles C. Moore Company of San Francisco, Calif. Work will commence at once. A reinforced concrete building is to be erected between the mills.

Two stacks 300 ft. high and 50 ft. in diameter at the base and 21 ft. in diameter at the top are included in the contract. The cost is unofficially estimated at \$2,000,000. The plant will supply power to the mills, the city of Longview and logging camps. Ultimate development of 20,000 hp. is expected.

Portland Power Company Reports Show Prosperous Year

Net revenues of the Portland Railway Light & Power Company are increasing in ratio faster than the operating expenses and the operating surplus for February is substantially larger than for the corresponding month a year ago. This situation likewise applies to the 12 months period to the end of February compared with the preceding yearly period.

The company's financial report for February shows operating surplus of \$116,451 compared with \$65,519 in the same month of last year. Operating surplus for the 12 months, to the end of February amounted to \$1,035,586 against \$799,186 for the corresponding period to the end of February, 1922.

The Railroad Commission of the State of California recently moved its offices from the Flood Building in San Francisco to the California State Building in the same city. The California State Building is located in the Civic Center.

Utah Builders Exchange Formed to Promote Building

An organization to be known as the Utah Builders' Exchange has been launched at Salt Lake City, for the promotion of the building industry in Utah. The membership of this organization is composed of representatives of the various building industries, such as general contractors, lumber dealers, electrical contractor-dealers, sheet metal contractors, brick manufacturers, etc.

Jacob A. Kahn, president of the Capital Electric Company, of Salt Lake City, has been chosen as president; George Q. Morris of Elias Morris & Sons, vice-president; James S. Taylor of the Morrison-Merrill Lumber Company, secretary; and P. L. Goddard, formerly of the Rocky Mountain Electrical Cooperative League, executive secretary. Ramm Hansen, a prominent Salt Lake City architect, is also a member of the Executive Board, which is composed of Messrs. Kahn, Morris and Taylor in addition to Mr. Hansen.

The objects of the Exchange are:

To bring together into one organization all reputable persons, firms and groups thereof engaged in designing, contracting, manufacturing, merchandising, constructing, or in any way identified with the promotion and protection of the building industry in the state of Utah.

To promote and establish permanently the "American Plan" open shop principle in the building industry in the state of Utah.

To provide ways and means for the promotion and permanent establishment of just, equitable and proper industrial relations between all the different factors in the building industry, most particularly the employer, the employee and the public.

To acquire, possess and distribute to members information of value to them having to do with the particular branch of the building industry in which they are severally engaged.

To establish and conduct apprenticeship schools for the development, education and encouragement of young men who may be induced to enter the building crafts, that the number of skilled proficient workmen may be increased.

To conduct an employment bureau as a medium of contact between employers and workmen in the building crafts.

To effect economies by the standardization of methods, in the interest of the public and its relationship to the building trades, to foster and encourage honest and businesslike procedure and practice on the part of all agencies in the industry.

The administration of the Exchange is vested in the Executive Board, which may consist of five or seven members. The Executive Board is selected from a body known as the Central Council, which is made up of representatives of each of the elements in the building industry. Members of the Central Council are selected by their representative groups. The executive secretary is in general charge of the operation of the Exchange, under the direction of the Executive Board.

Electrical Idea Is Advanced by Denver Radio Matinees

Radio matinees are the newest educational activity of the Electrical Cooperative League in Denver, Colo. Every Thursday at 3 p.m., mountain time, over the Winner Radio Corporation station (KFEL) talks are given by prominent electrical men on subjects related to the application of electricity in the home, inasmuch as the afternoon audiences are known to be largely women and children.

S. W. Bishop, the league manager, gave the introductory talk early in March and is responsible for the ar-

range of the program which will include such subjects as the use and servicing of appliances, laundrying by electricity, lighting the home, convenience outlets, etc. Relations with public service companies will also be featured later.

It is planned to occasionally feature a talk at night for the benefit of men who are interested in display lighting or improvements in the electrification of industrial plants. Talks are also being given along the same lines, but in person, to various schools in Denver.

Contract Let for Three Valves for Oak Grove Project

Contracts for three valves for the Oak Grove project of the Portland Railway, Light & Power Company have been awarded to the Pelton Water Wheel Company, of San Francisco. The contracts call for a 72-in. butterfly valve, to be used at the lower end of the penstock, a 72-in. Johnson valve, for the upper end, and a relief valve for the turbine.

The turbine is to be a vertical unit and will develop 35,000 hp., under a head of 850 ft., and will be the highest-head reaction turbine in the world. The turbine is being built in the San Francisco shops of the Pelton Water Wheel Company.

The annual report of the president of the Pacific Gas & Electric Company was broadcasted on April 10, from the Mercantile Trust Company's station at San Francisco. Wigginton E. Creed, president of the power company, delivered the message. It is the first time in the history of the industry on the Pacific Coast that an annual message to stockholders of an electric public utility has been broadcasted over the radiophone.

The California Oregon Power Company's territory uses more electric power per capita than any other area in the United States and perhaps in the world, according to W. M. Shepard, general agent of the company, who spoke at a meeting of the Copco stockholders recently. The average for the United States is 476 kw-hr. per capita per year, that of the whole state of Oregon 550 and that of the Copco territory 1,330. Mr. Shepard spoke of the present uses of electricity and prophesied an ever-increasing enlargement of uses, especially in the logging industry.

The British Columbia Electric Railway Company has let the contract for the construction of a high-tension transmission line from North Vancouver to Point Atkinson, to H. C. Peterson, of Vancouver. This is the first section of the line to provide power to the Britannia Mining & Smelting Company, at Britannia Beach. Tenders for the second section, from Point Atkinson to Britannia Beach, were opened on April 5. The estimated cost of the whole line, a distance of 30 miles, is \$150,000.

The organization of the Moravia Light & Power Company, a non-profit corporation, was recently completed at Sandpoint, Idaho, by the people who expect to secure light and power from this new company.

Investigation of Rapids to Be Celebrated at Banquet

A banquet to celebrate the appropriation of \$70,000 for the investigation of the Umatilla Rapids hydroelectric project on the Columbia River will be given April 30 by the Hydroelectric League of Oregon. The association is composed of people of the state interested in the development of hydroelectric power as a basis for future development of the district.

At the dinner N. J. Sinnott, representative in Congress from the Second District; Cyril G. Brownell, representative from Multnomah County; Governor Pierce and Guy W. Phelps, president of the Umatilla Rapids Association, will be among the speakers.

Books and Bulletins

DEPRECIATION OF PUBLIC UTILITY PROPERTIES

By HENRY EARLE RIGGS, A.B., C.E., professor of civil engineering, University of Michigan. 211 pages, 5½ by 8 in. \$2. Published by McGraw-Hill Book Company, Inc., New York.

The subject of depreciation is one which has caused much controversy and which, due to the rapid changes in the art of engineering, is still in an unsettled state. Any book which helps to present the true conception of depreciation as applied to valuation and the regulation of public utilities, is to be welcomed. In this book on the depreciation of public utility properties and its relation to fair value and changes in the level of prices, the author has pointed out certain important conclusions with which every one engaged in valuation work should be familiar.

The author attempts to consider the subjects of "fair value" and "depreciation" from an entirely unprejudiced viewpoint and to present his conclusions which have developed as a result of more than twenty years' practice. He states in his preface that this work is a "sincere attempt to find that middle ground of absolute fairness and justice which must be determined before the public utility issue can be considered as reasonably settled."

As a result of the war period price fluctuations, the questions of valuation and depreciation have been greatly complicated and the author warns against the danger of conclusions being reached which may have an effect upon utility properties through the weakening of the stability of valuations already established.

This work should be of value to engineers entering the field of valuation work as it presents considerable information concerning the legal decisions bearing on the relationships between the consumer and the utility giving the service. About one quarter of the book is devoted to legal decisions concerning depreciation.

As a constructive criticism it might be suggested that the use of graphic charts showing price fluctuations and possibly illustrating certain fundamental principles would add appreciably to the usefulness of the book.

E. R. S.

Meetings

Pacific Coast Group Technical Committees Hold Meeting

The final meeting of the sub-committees of the technical section of the Pacific Coast Electrical Association was held at Fresno, Calif., March 20-22. Over sixty out-of-town members of the association were present at the meeting.

During the three-day meeting it was decided that each sub-committee should present two or three short papers on correlated subjects at the Pacific Coast convention, instead of submitting a printed report of the year's activity. These papers will be designed to bring out discussion among the convention delegates.

Technical discussion centered around the subject of three-phase versus single-phase distribution transformers, 4,000-volt distribution and radio communication for central stations. Many of the companies represented favor three-phase distribution transformers and are using them extensively, while others feel that the single-phase type is more flexible under their operating conditions. A large number of the companies are using 4,000-volt distribution systems and others not doing so are changing their systems. Western power companies are rapidly adopting radio communication as a means of maintaining contact with distant power plants. Carrier radio telephone systems are being employed by several companies, while others are using straight radio telephone systems.

The operation of automatic and semi-automatic generating stations was also discussed by the men in attendance at the meeting. The investigation of the apparatus committee states that the economic limit of the automatic generating plant is from 1,500 kw. to 2,000 kw. and capacities below these two.

After the three-day conclave, the men in attendance were the guests of the San Joaquin Light & Power Corporation on several trips of inspection. Included in these trips were the new completely electrified sawmill of the Sugar Pine Lumber Company, the plant of the Sun Maid Raisin Association, outdoor substations and the Kerckhoff plant of the San Joaquin Light & Power Corporation. The Southern California Edison Company later conducted a party of twenty over its Big Creek Development in the high Sierra.

In furtherance of cooperation between the Mountain States Telephone & Telegraph Company and the electrical industry as a whole in Denver, a "telephone party" will be given in that city April 18 under the auspices of the Electrical Cooperative League. A dinner will precede the entertainment, the latter including a demonstration of telephonic interconnection and switchboard operation along with special musical numbers and vaudeville acts provided by Dean D. Clark, commercial manager of the company in Denver, and a member of the league advisory board.

Representative of Underwriters Addresses Oakland Club

Newly elected officers of the Electric Club of Oakland, Calif., presided at their first meeting on April 9. August Lutz, Oakland manager of the Pacific States Electric Company, the incoming president, presided at the meeting.

The speaker of the day was A. R. Small, vice-president of the Underwriters Laboratory. Mr. Small spoke on the work of the Laboratory and made particular reference to the work of the organization on the Pacific Coast.

An evening of unusual interest was provided by two faculty men from the physics department of Reed College, for those attending the March joint meeting of the Portland, Ore., sections of the A.I.E.E. and the N.E.L.A. Professor F. G. Tucker, assisted by Professor A. A. Knowlton, gave an illustrated lecture on "Ultra Violet Light." Ordinarily this might not be considered of sufficient interest to bring before a gathering of engineers, but in the hands of Professor Tucker the attention of the entire audience was held from beginning to end. Professor Tucker also conducted a series of experiments with intense ultra violet rays generated by a special piece of mercury arc apparatus.

A meeting of contractors and supply house representatives of the plumbing and steamfitting business in Denver was held April 3, with a view to forming an organization similar to the Electrical Cooperative League in that city. The success of the Denver organization, especially in its work with architects and builders, is believed responsible for the action. S. W. Bishop, league manager in Denver, was invited to attend and explain the plans, purposes, and accomplishments of such an organization.

COMING EVENTS

American Society of Mechanical Engineers—
Pac. Coast Regional Meeting—Los Angeles, Calif.
Apr. 16-18, 1923

Executive Committee, Pacific Coast Electrical Association—
Los Angeles—April 27, 1923

Southwestern Public Service Association—
Annual Convention—Fort Worth, Tex.
May 15-17, 1923

National Electric Light Association—
Annual Convention—New York, N. Y.
June 4-8, 1923

Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923

Northwest Electric Light and Power Association
Annual Convention—Seattle, Wash.
June 27-30, 1923

American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Oct. 2-5, 1923

The Denver Association of Electrical Contractors and Dealers recently decided to offer a prize for the best design of an emblem for the organization. It is desired that the name of the association be worked into the design as far as is possible. The contest is open to all members and will close April 24.

Denver Power Company Men Honor Local Manager

In commemoration of the first anniversary of Clare N. Stannard, as general manager of the Denver Gas & Electric Light Company, 600 men of the Doherty Men's Fraternity in Denver, Colo., assembled at a banquet held there recently. George Williams, general commercial manager of the Doherty properties, was also a guest of honor at the banquet.

Among the speakers of the evening were: D. C. McClure, superintendent of the electric department; R. J. Bardwell, legal counsel of the company; and Mr. Williams. V. L. Board, general superintendent of the company in Denver, acted as toastmaster.

The Electric Club of Los Angeles is about to publish a membership roster of the organization. The roster will be bound in book form and will be distributed to members in good standing. It is the intention of the compilers of the listing to arrange members' names alphabetically as to their own names as well as by firms. The roster will also show the member's name, occupation, telephone and membership number. Only members who are in good standing will be listed in the directory.

The Los Angeles Regional Meeting of the American Society of Mechanical Engineers will open at the Hotel Alexandria in Los Angeles on April 16. The program of the meeting calls for one technical session to be held on the morning of April 16, at which five papers will be presented. Following this session members in attendance will be conducted over points of interest in southern California, including the California Institute of Technology at Pasadena, and the laboratory and shops of the Mount Wilson observatory. Delegates will also visit some of the oil fields in the neighborhood of Los Angeles. Separate entertainment will be provided for visiting ladies. The convention will close April 18.

The date for the Pacific Coast annual convention of the American Institute of Electrical Engineers, has been changed so that the convention delegates will register at Del Monte, Calif., on Oct. 2. The convention will last until Oct. 5. The original date for the meeting was Sept. 25-27, the change being made necessary by a conflict of dates with other conventions scheduled at Del Monte.

K. E. Van Kuran, district manager of the Westinghouse Electric & Manufacturing Company, and R. E. Fisher, vice-president of the Pacific Gas & Electric Company of San Francisco, have been appointed a committee of two to arrange for transportation to the annual convention of the National Electric Light Association to be held in New York City. The men will endeavor to secure one special car from San Francisco and Los Angeles to accommodate the electrical men of the two cities who wish to travel to the convention in this way. The convention is to be held June 4-8 and men who wish to make reservations on the special car can do so by addressing either of the members of the committee.

Personals

Ray P. Jackson, for more than twenty years in the service of the Westinghouse Electric & Manufacturing Company, and who at present is manager of the material and process department at East Pittsburgh, has been appointed



RAY P. JACKSON

manager of the new Emeryville, Calif., insulator works of the Westinghouse company. Mr. Jackson will take charge of the factory construction work at Emeryville immediately. He received his electrical education at the University of Michigan, graduating with an engineering degree in 1902. Following this he took the Westinghouse apprentice course. After finishing the course in the shops he advanced steadily from the status of an apprentice to his present position as manager of the material and process department. From 1903 to 1906 he had considerable to do with the development of railway and control apparatus in the shops of the company. The next six years were spent in investigation of lightning arresters, and rectifiers for changing alternating current to direct current without the use of rotary converters. From 1912 to 1917 he specialized on insulators and the following two years were spent in the automotive department. He served as general technical assistant to C. E. Skinner in research work from 1917 to 1920, and was appointed to his present position in 1920. Marsden H. Hunt, ceramic engineer, will accompany Mr. Jackson as plant superintendent at the new insulator factory.

F. P. Nightingale, who was formerly connected with the General Electric Company, and who has just returned from a three years' stay in China in the interest of that company, is now connected with the Los Angeles office of the Pacific States Electric Company in the sales department.

L. F. Galbraith, superintendent of the new business department of the East Bay division of the Pacific Gas & Electric Company, has been elected president of the Oakland Ad Club for 1923. Mr. Galbraith acted as treasurer of the club during the past year.

V. L. Board, general superintendent of the Denver Gas & Electric Light Company, was toastmaster at a dinner of the Doherty Men's Fraternity in Denver, Colo., March 29 in honor of George Williams, general commercial manager of Henry L. Doherty & Company.

J. R. Collier, one of the contractor-dealers in Englewood, Colo., a suburb of Denver, has been nominated for alderman at the spring election in that city.

W. S. Eckley of the Pittsfield plant of the General Electric Company, is a recent Pacific Coast visitor.

Z. E. Merrill, formerly superintendent of the Washington Coast Utilities at Wenatchee, Wash., is now assistant general manager of the Mountain States Power Company with headquarters at Albany, Ore. Mr. Merrill's position with the Washington Coast Utilities has been filled by Frank Walsh, assistant superintendent of the Puget Sound Power & Light Company at Bellingham, Wash.

W. D'Arcy Ryan, head of the illumination research laboratories of the General Electric Company, recently visited Denver, Colo., to advise with the directors of the Colorado Pageant of Progress as to the scheme of illumination to be employed when that project is staged July 2-15.

E. S. Kassler, president of Nevada-California Electric Corporation with headquarters in Denver, the controlling company for the Southern Sierras Power Company, was one of the speakers at the annual banquet of the Southern Sierras Power Company at Riverside recently.

A. L. Wilson, telephone and telegraph engineer of the California Railroad Commission, has resigned, effective March 31, to engage in general private practice in consulting and engineering work in the telephone field. Mr. Wilson, who graduated from the University of the Pacific at San Jose, was connected with various telephone companies on the Pacific Coast for fifteen years, and entered the service of the commission as assistant rate expert when the late John M. Eshleman was its president. He became head of the division in 1913. Mr. Wilson served as a member of the Joint Committee on Inductive Interference from 1913 to 1917, assisting in drafting General Order No. 52, governing the construction and operation of power and communication lines for the prevention and mitigation of inductive interference.

M. D. Baer, for several years soliciting freight agent for the Bamberger Electric Railway, has been appointed general freight and passenger agent for that company with headquarters in Salt Lake City. Mr. Baer has been with the company in the traffic department since June, 1918.

Fred Brown, manager of the Mountain States Power Company in Eugene, Ore., for the last five years, has resigned and will move to Tacoma on April 15. He has purchased an interest in the Buffelon Lumber Company and will have charge of the auditing and accounting for the firm.

R. P. Sanborn, of the Edison Storage Battery Company of Orange, N. J., is making an extended tour of the Pacific Coast in the interests of the electric trucking industry.

George T. Barker, formerly in charge of lamp sales for the Denver Gas & Electric Light Company, has been appointed merchandise manager of that company and Jack West, specialty salesman, has been placed in charge of the sales floor.

Samuel L. Vauclain, president of the Baldwin Locomotive Works, will be the chief speaker at a gathering of engineers at the University of Colorado, May 25, according to a recent announcement of the Colorado Engineering Council.

C. F. Terrell, former superintendent of transportation in Seattle for the Puget Sound Power & Light Company, has been named superintendent of light and power for the company in the Bellingham district, a position recently made vacant by the promotion of R. U. Muffley. Mr. Terrell is succeeded in Seattle by Joseph Hellenenthal.

John D. Orr, division manager of the Idaho Power Company at Payette, Idaho, and R. B. King, superintendent of the company at Boise, recently inspected the properties of the Eastern Oregon Light & Power Company at Baker, Ore. The Idaho Power Company has recently closed a contract for supplying power to the Sun Portland Cement Company whose plant is located near Baker.

L. R. Brown, transformer specialist in the Pittsfield Works of the General Electric Company, is a recent Pacific Coast visitor.

George W. Saathoff, chief engineer of the Cities Service Company, is located at Boulder, Colo., temporarily in developing plans for the new generating plant to be located near that city for the Doherty interests.

E. A. Bradner, newly elected president of the New Mexico Public Utilities Association, has been identified with public service corporations for over thirty years. Starting as an arc light trimmer, he has held all intermediate positions up to that of manager, which office he now occupies with the Las Vegas Light & Power Company and the Las Vegas Transit Company. For a number of years Mr. Bradner was chief engineer and superintendent of the



E. A. BRADNER

Grays Harbor (Wash.) Railway & Light Company—and later became manager of the central station at Hobart, Okla., which position he held until 1919 when he was transferred to his present location.

Arthur D. Dana of New York City has resigned from the presidency of the Chicago Fuse Manufacturing Company of Chicago to become chairman of the Board of Directors of the company. William W. Merrill has been elected to the presidency.

E. G. Robinson, electrical engineer and president and manager of the Molalla Electric Company of Canby, Ore., and past president of the Northwest Electric Light Association, is a recent San Francisco visitor.

C. M. Mackey of the Mine & Smelter Company, El Paso, Tex., has been spending several weeks in Los Angeles in the interest of his company.

Charles T. Veal, president of the Dover Manufacturing Company, Dover, Ohio, recently spent several weeks in Pacific Coast cities supervising the sales campaigns which his company is inaugurating in this territory.

F. M. Feiker, assistant to the president of the McGraw-Hill Company, Inc., at the request of Secretary Hoover, of the U. S. Department of Commerce, has again been granted leave of absence to undertake the organization and general direction of the world surveys of raw material supplies, rubber, sisal hemp, and nitrates, for which Congress recently made an emergency appropriation of \$500,000. Mr. Feiker served as assistant to the Secretary of Commerce during the first year of Mr. Hoover's administration, acting as general assistant in organizing the personnel and industrial trade contact committees in relation to the Bureau of Census, the Bureau of Standards, and the Bureau of Foreign and Domestic Commerce. Out of his nine months' work came the monthly statistical survey of the Bureau of Census, the Division of Simplified Practice of the Bureau of Standards, Commerce Reports in new form, and fifteen so-called commodity divisions of the Bureau of Foreign and Domestic Commerce. Of this latter work the annual report of Dr. Julius Klein, Director of the Bureau of Foreign and Domestic Commerce, said: "The important task of carrying on this liaison work with the industries was under the general supervision of F. M. Feiker, Assistant to the Secretary of Commerce. Mr. Feiker's extensive experience and wide

Chester H. Loveland, a consulting engineer, has announced the organization of the Chester H. Loveland Engineers with offices in the Balboa Building, San Francisco. Associated with Mr. Loveland are C. I. Rhodes, former chief engineer of the hydraulic division of the commission, W. H. Davis, J. E. Daugherty, engineering and cost accountant of the commission, and Frank A. Daugherty. Consultation and practice will cover every phase of the financial and physical aspects of development projects.

E. C. Davis, formerly with the merchandising division of the Westinghouse Electric & Manufacturing Company at Pittsburg, is now in the Los Angeles office of that company.

Guy Zinck, formerly with the Westinghouse Electric & Manufacturing Company at East Pittsburgh, Pa., is now in the industrial sales department of the Los Angeles office of that company.

W. D. Crane, who has had considerable experience in merchandising the washing-machine and other electrical household appliances, is now with the Western Electric Company in Los Angeles.

Thomas F. McDonough is now in charge of the Northwest territory of the Benjamin Electric Manufacturing Company. He will have supervision over the states of Montana, Idaho, Washington and Oregon, with headquarters in the L. C. Smith Building, Seattle.

Carl O. Martin, formerly in charge of the Northwest territory of the Benjamin Electric Manufacturing Company, has been transferred to a larger field with headquarters in San Francisco. There he will be assistant to Miles F. Steel, Pacific Coast manager for the company.

G. E. Cullinan, general sales manager of the Western Electric Company of New York, recently visited Los Angeles and other Pacific Coast cities in the interests of his company.

H. B. Vanzwall, manager of the Sunbeam division of the National Lamp Works, Cleveland, was a recent Los Angeles visitor.

Charles A. Hone, formerly with Marshall Wells at Spokane, Wash., is now in the sales department of the Graham-Reynolds Company of Los Angeles.

Frank E. Shepard, president of the Denver Engineering Works; Thomas B. Stearns, president of the Stearns-Rogers Manufacturing Company; and Charles S. Thomas, prominent Denver, Colo., attorney and former United States senator, were elected directors of the Denver Gas & Electric Light Company at the annual stockholders' meeting of that company in Denver, held March 28.

J. M. Buswell, general inspector of the San Joaquin Light & Power Corporation, Fresno, Calif., will shortly leave for a six weeks' trip to Chicago, New York, Washington and eastern industrial centers.

F. M. Faude, assistant hydraulic engineer of the California State Railroad Commission, has been named chief engineer of the hydraulic division to succeed C. I. Rhodes, resigned. Mr. Faude is a graduate of the University of Minnesota and was formerly employed in the United States Reclamation Service.

W. M. Shepard, general agent of The California Oregon Power Company, was made vice-president and general agent of the company at a recent meeting of the board of directors. After graduating from the Alabama Polytechnic Institute in 1904, he spent about a year with the Knoxville and Northern Railroad. In 1905 he took the General Electric Company test course and in 1906 was transferred to the Atlanta office of the company and later to the San Francisco office. While with the General Electric Company in San Fran-



W. M. SHEPARD

cisco he worked successively as supply salesman, apparatus salesman and special agent and was active in applying electricity to gold dredging and other typically western industries. He went with The California Oregon Power Company in 1916 as commercial agent and became general agent in 1918. He has had charge of all commercial activities of this company since his affiliation with it, including negotiations of interconnection agreements with other power companies and in addition has been in charge of valuation work and rate matters of the company.

Walter J. Dodge has been appointed telephone and telegraph engineer of the California Railroad Commission, to take the place of Telephone and Telegraph Engineer A. L. Wilson, who has resigned to take up private practice. Mr. Dodge graduated from Stanford University in the class of 1913 in electrical engineering. After graduation he spent five years with the American Telephone & Telegraph Company in New York City and in California in connection with inductive interference investigation carried on under the auspices of the California Railroad Commission. Since 1918 Mr. Dodge has been employed by the California Railroad Commission, as assistant engineer, in the gas and electrical division, specializing on public utility service and rate matters.

Clare N. Stannard, vice-president and general manager of the Denver Gas & Electric Light Company, has been elected a member of the board of managers of the new million-dollar Presbyterian hospital in Denver, Colo.

C. B. Merrick, who has been with the Valley Electric Supply Company of Fresno, Calif., has rejoined the San Joaquin Light & Power Corporation as assistant to the new business manager.



F. M. FEIKER

contact with industrial organization and individual manufacturers is largely responsible for the striking success which has accompanied this innovation in the organization of a government department."

Manufacturer, Dealer and Jobber Activities

The P. A. Geier Company, of Cleveland, Ohio, has recently prepared a window display for dealers handling the Royal vacuum cleaner. The display is a Dutch scene, with a windmill having metal arms which may be propelled by the blast from a cleaner hose. The whole arrangement demonstrates the power of air and gives the display some moving object to attract attention to it.

Norton & Norton, an electrical establishment in Los Angeles, Calif., recently opened a new store at 1375 North Broadway, by presenting free dancing, music and refreshments for the guests. Prize coupon checks were distributed free to visitors and a drawing was held, the person holding the lucky number receiving a Royal electric cleaner. Other appliances were also given as prizes.

The Hurley Machine Company has recently opened the Thor Electric Shop in Portland, Ore., with H. T. Carstens of Seattle as manager. The store is directly under the home office in Chicago and will be conducted along much the same lines as other Thor stores on the coast. A retail business and a service station will be maintained. A complete line of Hurley goods will be carried at all times and a competent sales force, including demonstrators for window demonstrations, employed. In addition to aiding Thor dealers by means of the new service station, any Thor dealers in the city may make full use of the Thor Electric Shop, sales room and demonstrators.

G. B. M. Medearis has opened a new electrical appliance store to be known as the Ell-Bee Appliance Company at 810 American Ave., Long Beach, Calif. A full and complete line of electrical appliances will be carried. Mr. Medearis was formerly manager of the F. A. Clarge Good Housekeeping Shops. He was, before coming West, sales manager for the Wisconsin-Minnesota Light & Power Company at La Crosse, Wis., and held a similar position with the Iowa Gas & Electric Company at Washington, Iowa.

Frank J. Klimm has opened a new appliance store at 456 Ellis St., San Francisco. George Brouillet has been appointed manager of the new shop.

J. W. Burrehaell, electric fixture manufacturer, will move about May 1, 1923, from 357 Ellis St., San Francisco, to his new location at 434 Larkin St. Increased business and the need for larger quarters are the reasons for the change in location.

Frank J. Mercier and George A. Stoll have taken over the electric shop of P. Swartz, 922 Clement St., San Francisco. In the future the store will be known as the Frank J. Mercier Electric Company. Mr. Mercier was formerly connected with the Byington Electric Company and Mr. Stoll with the Walsh Laboratories, both of San Francisco.

The Jeffery-Dewitt Insulator Company, Kenova, W. Va., has recently received large orders for insulators from the Southern Sierras Power Company of Riverside, Calif., and the Washington Water Power Company, Spokane, Wash.

A. Bradshaw, who has been connected with the Steventon Electric Company of San Diego since its organization, has resigned to establish a new jobbing house in that city to be known as the A. B. C. Electric Company. Headquarters for the new company are at 872 Seventh St., San Diego.

The Edison Electric Appliance Company has announced that it is ready to place on the market two new flexible cloth heating pads, 9 x 11 and 12 x 15 in. respectively. The pads are designed to operate from any electric outlet from 95 to 125 volts.

The Westinghouse Electric & Manufacturing Company has placed on the market a new automatic reel-type electric bake oven which provides for uniformity of baking by means of automatic temperature control. Baking has been reduced to a timing operation by means of the new oven, which permits a maximum production.

The Standard Underground Cable Company has moved its general offices and Pittsburgh sales office from the Westinghouse Building to the company's new factory and office building at 100-108 Seventeenth St. The new building is a four-story brick and steel structure occupying an entire block.

The Sprague Electric Works of the General Electric Company announces the consolidation of its district and local offices with the General Electric Company. The manufacture and exploitation of Sprague products will be continued in the name of the General Electric Company in the recently organized merchandising department.

The Winner Radio Corporation of Denver, Colo., has moved its headquarters from 1710 Glenarm St., to 1435 Welton St.

W. H. Harrison, electrical contractor and dealer, has opened a store at 1015 E. Anaheim Blvd., Long Beach, where a complete line of fixtures and appliances are carried.

The Charter Gas Engine Company, Sterling, Ill., has purchased the oil engine business of the August Mietz Corporation of New York City. This consolidation brings together two of the oldest and best known internal combustion engine manufacturers in the world. The equipment of the Mietz company will be moved to the Charter plant at Sterling, which has been doubled in capacity.

The American Insulated Wire & Cable Company, Chicago, has begun the manufacture of magnet wire which will be marketed under the trade name of A-1 Magnet Wire. The line manufactured by the company will include plain enameled, single and double cotton covered, single and double enameled, single and double silk covered and single and double silk enameled.

The General Electric Company has recently published Bulletin No. 41316 which gives a brief treatment of the development of ice-making machines. A share in the increase which has occurred during the past few years is attributable to the slow speed synchronous motor, which is now almost universally used for driving ice-making equipment.

D. B. Brinton has purchased the interest of George A. Himley in the Brinton-Himley Electric Company of Murray, Utah. Mr. Brinton plans to increase the stock of the store and its facilities in the near future.

The Pikes Peak Electric Company, 125 North Nevada Ave., Colorado Springs, Colo., has been incorporated by H. F. Pinnock, H. H. Pinnock and R. K. Dougherty.

The United Electric Company, Canton, Ohio, has announced a new model Ohio electric cleaner. Many new features have been incorporated in the new machine including a patented self-starter, which has been made the subject of the company's slogan, "The Cleaner with the Self-Starter."



If you are looking for information about the multiple conveniences of the electric washing machine, vacuum cleaner, dish washer, ironer, sewing machine or range, here is a team that cannot be beaten. Alfred H. Nicoll, the smiling gentleman on the left, is specialty salesman for the Western Electric Company in San Francisco, while his partner, Burton Y. Gibson, can tell you more about the Western Electric Crawford range than any man in the country. Incidentally, if there is ever a meeting of members of the electrical industry in their section of the country, which is not attended by one or both, it is because fire or earthquake has kept them away.

Trade Outlook

San Francisco

Building construction continues apace in San Francisco and the metropolitan area surrounding. Electrical contracting is reported as excellent with all of the local contractors busy. Electrical dealers have reported an improvement of business during the past two weeks period. Radio sales are reported to be about the same as this time a year ago, but that buyers are becoming more discriminating and, as a result of competition, prices are lower. A gradual elimination of dealers who are not good merchandisers is noted.

Prospects are favorable for a large and early fruit crop, and recent rains have improved the general agricultural outlook. This has resulted in an improvement of trade in the rural districts. Mining and oil operations as well as construction work have absorbed available labor supplies, and wages are reported good.

Seattle

Reports from all parts of the Puget Sound country indicate that spring activities in practically all lines are under way, and prospects for a prosperous spring and summer business are encouraging. Public improvements will be heavy, particularly street and highway work, for which satisfactory appropriations were made by the recent Legislature.

Building activities show a heavy increase, this condition existing in all lines of new building. Apartment structures appear to be popular. This is always interesting to electrical men, especially since in Seattle electric ranges are being installed in all of the higher-class apartments. In the furnished buildings, it is customary to provide an electric vacuum cleaner in many of the more expensively equipped structures.

Department stores report a substantial increase in net sales, during March, as compared with the first three months of the year. During February, the increase in net sales as compared with February of 1922 amounted to 20.1 per cent, and March is expected to make an even better showing.

According to figures prepared by the Seattle Port Warden, the first three months of 1923 have maintained the forward movement that made 1922 one of the banner trade years in the history of the city's waterborne commerce. Heavy gains in import movement are noted.

Electrical dealers and contractors are preparing for a very busy spring period,—stocks are in fairly good shape, and if the car shortage is averted, conditions will continue favorable, it is believed.

Portland

Generally speaking, business in this district is in a prosperous condition. This is due in a large part to the healthy condition of the lumber busi-

ness, where difficulty in keeping ahead of orders is reported. Production is 15 per cent above normal. The demand for all grades of lumber is very active, both from foreign and domestic buyers. Over 15 million feet left Portland by water during March to care for California's building boom, with large shipments to Atlantic and mid-western points. In the foreign trade the Orient is probably the heaviest buyer, with Australia, South America and Europe also taking considerable quantities.

Portland's shipping shows considerable gain over a year ago. During March 125 vessels representing 320,448 tons net register entered Portland harbor as against 99 vessels of 264,306 tons one year ago. This brings the total arrivals for the first quarter of 1923 to 320 vessels of 850,659 tons, as compared with 269 carriers of 727,774 tons one year ago.

Bank clearings for Portland for the first quarter of 1923 were 14 per cent over 1922 and building permits for the same period showed a 23 per cent gain.

Central stations are in the market for a large amount of equipment. Both of the Portland power companies are making large expansions and the loads are growing rapidly.

Jobbers report a slackening of orders for wire, attributed to early buying by contractors for stock, when prices were rising. Collections in the contract dealer class show a slowing up—the average length of time for outstanding accounts in the Northwest for February being 57 days.

Denver

Bank clearings gained \$32,061,931.83 during March over the same month last year with a high total of \$160,518,985.16 and building permits approximating close to two million dollars equaled the total of the first two months of 1923. This is a basic index of improving business conditions here.

In Pueblo a new record for steel production west of the Mississippi River was established in March with a total of 52,440 tons, a figure far in excess of the March, 1917, record. Coke production increased also.

The agricultural regions, especially where sugar beets are the prevalent crop, are rejoicing over additional payments on the crop of last year due to increasing prices on sugar. Additional payments of over two million dollars have greatly improved financial conditions in those sections.

Building materials are increasing in price almost daily and higher wages went into effect the first of this month, but this does not prove deterring to the general program, judging from the new projects being announced regularly. Industrial plants and central stations all seem to be making improvements and additions.

Although some lines of electrical materials are scarce, there is no marked dearth, thanks to improving transpor-

tation conditions reflected by the railroad reports of increased tonnage and car loadings for the past month. Reserve stocks are not being purchased owing to uncertain prices. Wire, conduit, and schedule materials are moving rapidly and appliance sales are picking up.

Salt Lake City

One of the most significant indications of continued and increasing industrial and business activity in this section is a recent statement made by D. C. Jackling, manager of the Utah Copper Company, who pointed out the bright prospects for copper and told of the near approach of the Utah Copper Company to its former production. He stated that he hoped by the end of this year to have the Utah Copper Company yielding and reducing 40,000 tons of ore daily. This means a large amount of money poured into the channels of trade in Utah.

With lead, copper, and other metals, sugar and wool at satisfactory price levels, there is a decidedly optimistic feeling throughout this section.

Several new industries are planning to begin operations in Salt Lake City in the near future, and construction work has started on the plant of the Columbia Steel Corporation near Provo, Utah.

Activity in real estate transfers and building in Salt Lake City indicates a healthy growth and forecasts a year of prosperity. Plans are being drawn or construction work started on many homes and apartments.

Healthy increases are reported in the value of retail sales in general in this territory, as compared with corresponding periods of last year.

New home building is stimulating electrical appliance sales.

The Utah Power & Light Company sold 1,120 washing machines during its March campaign.

Los Angeles

Surpassing any other previous month in the history of the city by more than \$8,000,000, building records for March show a total of 5,556 permits, with a valuation of \$21,196,087, which were issued in Los Angeles. This is an increase of \$14,280,871 over the valuation of building permits issued in March, 1922, and a gain of \$9,115,777 over February, 1923. So far this year the valuation of the 14,306 permits granted, totals \$44,534,914.

The real feature of the new March building record is not altogether in the fact that the valuation is \$21,196,087, but the records also show that permits issued here last month will provide accommodations for 3,507 new families.

The Collector of Internal Revenue for Los Angeles District reports that 225,000 returns of all kinds were filed in this district compared with 185,000 last year, a gain of 40,000. Individual returns to the number of 198,405 were made.

Manufacturers and jobbers report large sales of electrical supplies and appliances, while dealers report the sales as being excellent for this period of the year.

Construction News

Bridges

Ariz., Yuma—W. W. Wilson, superintendent of Tucson division, Southern Pacific Railway, states that work will start on new bridge over Colorado River as soon as engineers have decided that the site tentatively selected is suitable. The bridge will cost several million dollars.

Ore., Salem—The following bridge contracts have been awarded by the state highway commission: Canby-Aurora section of Pacific highway in Clackamas County, bridge No. 584 over Pudding River, near Aurora, to Tobin & Pearce of Portland at \$74,750; Hayden Creek-Keno section of the Ashland-Klamath Falls highway in Klamath County, bridge No. 955 over Klamath River near Spencers, to the Union Bridge Company at \$41,510, contingent on approval of federal and county governments.

Wash., Vancouver—Clarke County commissioners announce that plans will be drawn immediately for a bridge over Washougal Creek, on the route of the North Bank highway, the estimated cost of the structure to be \$25,000. Bridge will be of steel, two spans, one of 140 ft. and the other 70 ft.

Wash., Spokane—C. L. Graves, here, on a bid of \$27,275, received the contract for three bridges on the Valley Chapel-Mount Hope road. Bridges will be of concrete.

Wash., Seattle—At the city election of May 8, voters will pass on a bond issue to construct the Montlake-Stadium bridge, across the Lake Washington Canal, direct to the University district. Such a structure is estimated to cost \$500,000.

Wash., Everett—Snohomish County has commissioned the Union Bridge Company to prepare plans for erection of three steel spans, two of which will cross the Stillaguamish River at Arlington, and the third will replace the Snoqualmie high bridge, near Monroe. The three bridges will cost \$100,000 and will provide spans 20 ft. wide. The two spans, known as the Lincoln and Haller bridges, across the Stillaguamish, will be 210 ft. and 200 ft. respectively; the third will be 220 ft. long.

Dams

Wash., Everett—Contractor T. M. Morgan of Everett has been awarded the contract to construct the new twenty million gallon reservoir on his bid of \$150,725.

Highways

Calif., Santa Barbara—County Surveyor Owen H. O'Neill has been instructed to prepare plans and specifications for a permanent road division in the Santa Ynez valley. This is the first step toward the paving of 25 miles of highway in this territory. The petitioners asked for 18-ft. oiled macadam roads. The proposed road will connect with the San Marcos road and run through Solvang, Janin's corner, Ballard, Los Olivos and Zaca station. The project will amount to approximately \$1,000,000. The district represented embraces 400,000 acres.

Ore., Salem—The state highway commission has made the following awards of contracts for highway construction: Redmond-Cline Falls section of the Mackenzie highway in Deschutes County, a county and state project, 4.78 miles grading and surfacing to G. K. March, Spokane, at \$36,829; Lamprey Creek-Fat Elk Creek section of the Roosevelt Coast highway section in Coos County, 7.75 miles of grading to John

Hampshire of Grants Pass, low bidder on concrete pipe at \$220,350, contingent on approval of federal and county governments; Eugene-Goshen section of the Pacific highway in Lane County, 4.5 miles of pavement resurfacing and 0.43 miles of new pavement to Force & Currihan of Portland at \$100,000—a state project; Otter Rock-Agate Beach section of the Roosevelt Coast highway, 5.5 miles of grading to Hetrick, Kline & Gardner of Portland at \$181,080—a state project.

Ore., Salem—Marion County is working on a market road program that was sanctioned by popular vote, authorizing bonds to be issued in the sum of \$850,000; 25 to 30 miles of paving is planned for this year and 5 paving plants are to do the work. This is a five-year program, with two more years to run. The original program called for 100 miles of paved market roads and 50 miles of graveled roads connecting with them—joining all the principal towns of Marion County together with highways that can be traveled every day in the year in comfort.

Ore., Oregon City—Contracts for two of the road projects were recently awarded by the Clackamas County Court. The Oswego-Wilsonville road, the Oswego-Athey bridge section, a one-course concrete pavement 9 ft. in width eliminating the crushed rock shoulders, went to C. P. Archer of 1025 Frances Ave., Portland, for \$33,615. Project No. 6 on the Oregon-Molalla, a one-course concrete pavement 9 ft. in width, with crushed rock in gravel shoulders, to the Oregon Contract Company, 300 Blake-McFall Building, Portland, at \$42,499. There are 5 other projects to be awarded.

Wash., Tacoma—Pierce County commissioners will receive bids until April 25 for paving 2.8 miles of Pioneer Way, P. H. No. 19. Estimated cost of the improvement is not reported.

Wash., Spokane—The Spokane County program calls for 90 miles of macadam and an expenditure of \$850,000. County Commissioner D. H. Ham plans to have every mile of the work surveyed so the right-of-way may be cleared up by fall. The program outlined is the biggest mileage program ever planned with bond money and covers the sections of roads voted at the time the bond issue was authorized. There is no concrete or asphalt to lay next year.

Ore., Salem—The state highway engineer, James F. Allen, announces that the state highway program for 1923 will involve an approximate expenditure of \$4,465,000 to be used in the construction of primary highways and bridges. The largest job to be undertaken is the paving of 36½ miles of the Pacific highway between Toledo and Kalama which will result in a continuous stretch between Tacoma and Portland. The work will be let in seven contracts involving an estimated total of \$1,380,000. Contracts are to be let soon for all work.

Wash., Kelso—The Kelso-Castle Rock road project has been awarded to J. Worter of Tacoma at \$171,951; 5.29 miles of the Pacific highway to be graded, drained and paved between Kelso and Stockport. The same bidder was awarded the contract for similar work on 4.62 miles at \$148,435, from Stockport to Castle Rock.

Irrigation

Calif., Sacramento—A contract providing for the construction of approximately thirteen miles of levee work in Reclamation District No. 1,660, Sutter County, was awarded to the W. E. Calahan Company of Texas by the state reclama-

tion board at a recent meeting. The cost of the work will approximate \$1,000,000.

Mont., Missoula—Plans for the expenditure of \$600,000 on Flathead projects by the U. S. Reclamation Service have been made known. For the completion of the concrete arch dam of Hubbard reservoir, for Camas division, \$223,000; for enlargement of the Ninepipe reservoir in Mission Valley, \$120,000; construction of Taber canal to the north fork of Jocke River, \$88,000; enlargement of the table canal, \$40,000; construction of laterals of Mission Valley division, \$30,000; construction of laterals for Camas division, \$10,000; construction of laterals on the Jocke division, \$45,000; operation and maintenance, \$55,000.

Wash., Kelso—Plans for the Long-Bell Lumber Company for enlargement of Diking District No. 1 have been approved by Cowlitz County commissioners, the plans providing for protection of Longview, West Kelso and the Long-Bell Lumber Company's holdings. The enlarged district will contain 12,000 acres, and improvement will cost \$2,250,000.

Wash., Centralia—The excavation of approximately 200,000 cu. yd. of earth is involved in a contract upon which bids will shortly be called by the commissioners of diking and drainage district No. 1 at Centralia. Project provides for draining about 4,000 acres of land near Centralia. Guy Smith is secretary.

Power Plant Equipment

Colo., Denver—Recent improvements announced by the Denver Gas & Electric Light Co. include a new \$100,000 gas holder and pump house at 20th and Marion Streets, a new substation at 39th and York Streets, and extensive additions to the Barker substation.

Power Projects

Colo., Denver—A hydroelectric power project in Hinsdale County has been assured by L. F. Hulen and associates of this city, from the Hinsdale Mining & Development Co. and the Golden Fleece Consolidated Mining Co., and plans are being made for the realization of a 6,000-hp. plant to be located near Lake City, Colo., and close to the site of the present Granite Falls plant. They include the construction of a dam with bedrock foundation and spillway at the lower end of Lake San Cristobal, the largest natural body of water in Colorado, so as to raise the level of the lake 60 ft. and to impound 30,000 acre-feet in storage. A 12,000-ft. pipe line will provide a drop at the power house with a static head of 313.7 ft. H. B. Barnes, consulting engineer of this city, is in charge of the project.

Wash., Seattle—Bonds of the Skagit power project, under development by the city of Seattle, in the sum of \$2,520,000 have been sold to R. C. Storrie & Co., San Francisco. The sale of these securities will permit the city to complete the first 50,000-hp. Gorge Creek unit of the Skagit project and deliver power in Seattle, according to C. F. Uhden, engineer in charge. The money from the bond issue will finance completion of the power house, complete the Timber Creek dam, build the transmission lines, install the generators and machinery and build the substations. One substation for the Skagit project, north of the city limits, to cost \$200,000, is to be built by day labor under the direction of C. F. Uhden, chief engineer.

Wash., Walla Walla—K. C. Harland, here, has obtained power rights on the Walla Walla River, above Milton, Ore., where he plans to develop power to irrigate 10,000 acres of land, and at the same time develop 4,000 hp. A six-mile flume will be built.

Wash., Olympia—Work of constructing a new power line between Olympia and Tenino, connecting the line of the Puget Sound Light & Power Company from Vancouver and through

Centralia, will begin shortly, and be finished within the next three months. The high line which the Olympia Light & Power Company has been using for several years to get its auxiliary service from the White River power station by way of Tacoma will be connected on as part of the new service.

Wash., Colville—Extension of the power line of the Stevens County Power & Light Company from Colville through Echo Valley and Lake City to Marble will supply a large section of farming country with electricity this summer. The Upper Columbia Company of Marble has contracted with the power company for a minimum of 200 hp. on a 10-yr. contract.

Railways

Ore., Portland—The Portland Railway, Light & Power Co. plans the improvement of streets and the replacing of tracks in the coming year, to cost approximately \$500,000.

Ore., Marshfield—Officials of the Western White Cedar Company have announced that a standard gage railroad will be constructed on Dement Creek in southern Coos County, to tap a white cedar tract of 60,000,000 feet. The road will be 2½ miles long and will cost the company \$40,000. The road will connect with the Southern Pacific and logs can be forwarded to Coos Bay, the company's manufacturing and shipping center.

Wash., Kelso—Twohy Bros., of Portland and Seattle, have been awarded contract for construction of the roadbed for the Longview, Portland & Northern Railway Company's double track road, which extends about 30 miles from Longview to a point near Olequa. The contract price exceeds \$1,000,000.

Ariz., Tucson—According to H. B. Titecomb, president of the Southern Pacific Railway of Mexico, grading on the new section of road between Tepic and La Quenmada, will start within two weeks. This portion of the railroad will close the only gap between Tucson and the City of Mexico. This section will be about 100 miles.

Ariz., Tucson—George B. West, one of the men interested, states that a new rail line from Farmington to connect with the Santa Fe Railway at Gallup, N. M., will be constructed by a group of men, including Harry Chandler, E. P. Clark, M. H. Sherman, Los Angeles, and others who are financially interested in the San Juan basin land. Surango, near Farmington, is the center of an oil boom.

Calif., San Bernardino—W. A. Bichnel has the contract to erect the new 10-stall reinforced concrete round house at Yermo for the Union Pacific Railway. Cost, \$46,000.

Calif., Los Angeles—Bids for the construction of a brick administration building at the Division One car house of the Los Angeles Railway, Sixth Street and Central Avenue, have been advertised. The building will adjoin the present car house and will have a frontage of 30 ft. on Central Avenue and be 262 ft. long. The west of the building will contain the office of the division superintendent, cash receivers and office clerks who issue transfers and other supplies to the trainmen. The greater part of the space will be devoted to the trainmen's waiting room, which will be equipped as a library, with game tables and steel lockers.

Mont., Miles City—Two sub-contracts for the construction of the proposed north and south line of the Montana Railroad Company for a distance of 100 miles out of Miles City have been awarded. The first 50 miles south of the intersection with the Milwaukee tracks was let to J. E. Hilton, of Sheridan, Wyo.; the second 50 miles will be built by E. J. Prah of Miles City, Mont.

Street Lighting

Calif., Los Angeles—Osborn Electric Company, Turlock, submitted low bid to board of public

works, at \$11,234, for installing ornamental lighting system on Pacific Ave. between Oliver St. and Third St., San Pedro.

Calif., Los Angeles—A. C. Rice, 1963 Santee St., submitted low bid to board of public works at \$9,600 for installing ornamental lighting system in Sunset Blvd., between Vista St. and Stanley Ave.

Calif., Los Angeles—C. W. Sparks, 433 San Fernando Bldg., submitted low bid to board of public works at \$10,587 for installing ornamental lights on 14th St. between 30 ft. west of Beacon St. and Pacific Ave., San Pedro.

Calif., Los Angeles—Estimates of city engineer, W. G. Knox, for lighting Fourth and Fifth Streets are \$14,000 for the former and \$16,000 for the latter. Thirteen city blocks are contained in each system. There will be eighty metal standards on Fifth Street and seventy on Fourth Street. Plans and specifications for the system are being prepared.

Ore., Roseburg—The light committee of the city council has been given power to proceed at once with the purchase and installation of a complete new street lighting system for the business district. Cluster lights on ornamental posts are to be installed at a cost of approximately \$10,000.

Wash., Everett—The installation of a complete new street lighting system for the business section of the city is being considered by the council and the Everett Chamber of Commerce. A proposition submitted by Ne Page, McKenna Company, electrical contractors, quotes a price of \$1.25 a front foot to the merchants, eliminating the street lighting system now in use and substituting a new pole, with individual lights on each pole.

Wash., Tacoma—The city council recently authorized the expenditure of \$112,000 for the light department, covering a year's supply of electric meters and transformers, and a quantity of cables, gloves and lamp standards for ornamental street installation.

Streets and Sewers

Calif., Mayfield—Sewer and water bonds in the amount of \$50,000 carried at an election held March 27.

Calif., Vacaville—A bond issue for \$40,000 to cover street improvements within the city limits carried at a recent election. The city trustees have instructed the city engineer to prepare specifications for the first unit, work on which will be started at an early date.

Calif., Stockton—The city trustees have instructed W. D. Harrington, city engineer, to prepare plans and specifications for a sewage disposal plant to be constructed here at a cost of \$75,000. The Imhoff system will be used.

Calif., Lodi—Contract to build a sludge sewage disposal plant for this city has been awarded to Davis, Heller & Pearce Co. The plant will cost approximately \$83,000.

Wash., Seattle—Contract for grading and concrete walks on 26th N.E., et al., estimated to cost \$32,061, has been let to D. H. Traphagen, Walker Building, for \$29,527. Contract for grading and concrete walks on West College Street, was let to Odman Construction Company, on a bid of \$10,806. Bids recently opened for grading and paving of 9th Avenue South, estimated to cost approximately \$550,000, showed that Puget Sound Bridge & Dredging Company, on a bid of \$496,623, was low. Council took the matter under advisement. The work involves the removal of 750,000 cu. yd. of earth, and 23,050 sq. yd. of 8-in. concrete paving and 7,900 ft. of concrete curb. This project is a part of the Beacon Hill regrade project. Bids were also opened for grading the Golf Heights City property, part of the Beacon Hill regrade, on which the Puget Sound Bridge & Dredging Company, at \$74,484, was low. This bid was also taken under advisement. The work involves the re-

moval of 646,000 cu. yd. of earth. Contract for grading in Island Drive was let to the Odman Contracting Company, on their bid of \$14,208.

Wash., Hoquiam—This city plans the installation of nearly five miles of sewer mains in the Emerson Avenue district, at an estimated cost of \$75,000. Bids will be called for shortly.

Wash., Everett—Paving of Pacific Avenue, from Wetmore to Broadway, with 6-in. concrete, 18 ft. wide, is proposed. City engineer is now preparing plans for the work and bids will be called for shortly.

Waterworks

Ariz., Tucson—Improvements costing approximately \$700,000 will be made in the city water distributing system, according to recent announcement made by G. H. Atchley, city water engineer.

Utah, Huntsville—Plans have been completed for the installation of a modern water system here, the water to be piped from springs on the south side of the valley, two miles distant from the town proper. The water system will be owned by a corporation which in turn will be owned by the farmers of the community. The cost of the project will be about \$35,000.

Wash., Seattle—All bids for the construction of water mains in Leo Street, et al., estimated to cost \$131,365, have been rejected, and new bids will be called. Low bid was that of Paduano & Company, at \$134,090. The work involves 30,175 ft. of 8-in. cast iron pipe; 5,425 ft. of 12-in., 2,025 ft. of 16-in., and 50 ft. of 20-in. pipe.

Wash., Everett—Contract for the construction of the 20,000,000-gal. water reservoir to be built as part of proposed waterworks improvements, has been let to T. M. Morgan, Everett, on a bid of \$150,635, which was \$3,000 lower than the next bid. All bids for laying a 28-in. water main north and south through the city were rejected, and new bids will be called. The low bid for this work was that of the Sumner Iron Works, Everett, at \$115,000. Cast iron pipe will be laid.

Miscellaneous

B. C., Vancouver—The Dominion Government has issued instructions to the Wallace Drydock Company, of Vancouver, to proceed at once with the construction of a floating drydock on the north shore of Burrard Inlet, Vancouver, at a cost of \$2,500,000.

Buildings (Industrial)

Ariz., Douglas—A. G. McGregor, engineer of the Calumet and Arizona Smelter, has received plans for the enlargement of the plant. A crew of 20 men is at work on excavation. The work on the plant, estimated to cost approximately \$1,000,000, will employ many skilled mechanics.

Ariz., Mesa—Attaway-Phelps Cotton Co. will expend approximately \$50,000 on a cotton seed oil mill. E. G. Attaway, president. The mill will have four presses. Machinery has been ordered.

Calif., San Diego—Preliminary work has been started on the factory to be built by Vitritified Products Co. on a 17-acre site in Old Town. George W. Kummer is general manager and has charge of laying out the plant. A construction engineer of the American Clay Machinery Co. is on the ground.

Calif., Los Angeles—Architect Albert C. Martin, 430 Higgins Bldg., has completed plans for a 4-story class C furniture warehouse to be erected on Santa Fe Ave. near 8th Street for J. M. Overell Co. Brick walls, 80 x 150 ft., composition roofing, metal skylights, pressed brick facing, maple floors, steel sash, elevator, structural steel, sprinkler system, loading platform, fire escapes. Bids will be taken at once.

Calif., Fresno—Plans are being completed by the engineering department of the San Joaquin Light & Power Corp., Fresno, for construction of a transformer warehouse, a salvage warehouse, general store rooms, meter testing and testing transformer department, a pole treating plant, a dipping plant and a crossarm mill, to be constructed on a 63-acre tract at Orange and California Streets, adjoining the Southern Pacific Co. industrial yards. Estimated cost of the above structures, approximately \$300,000.

Calif., San Francisco—Plans have been drawn by Edw. T. Flaherty, architect, I. W. Hellman Bldg., Los Angeles, for a seven-story class C storage building to be erected on Geary Street, at Masonic Ave., for the Bekins Fireproof Storage Company. Estimated cost, \$350,000.

Calif., San Francisco—Daniel O'Neill is planning the erection of a 2-story machine shop on the north side of Folsom Street, west of Fourth, to cost \$20,000.

Calif., Yuba City—Negotiations are now in progress whereby the Earl Fruit Company will erect a fruit packing shed and cold storage plant at a cost of approximately \$200,000.

Calif., San Pedro—Harbor Dept., Los Angeles, will erect a cotton warehouse on the channel at the foot of 22nd St. It will have a capacity of 50,000 bales. Estimated cost \$50,000. J. W. Ludlow, harbor engineer, assisted a group of city and warehouse officials to select a site.

Calif., Los Angeles—MacDonald & Kahn, Loewe's State Bldg., have a contract to erect a \$100,000, 4-story class A, concrete loft building at northwest corner Santa Monica Blvd. and Lodi Place for the Cinema Properties Co., Adolph Fleishman, president. Site, 135 x 125 ft. Foundation will provide for additional stories.

Calif., San Pedro—Davidson Construction Co., 1445 E. 16th St., has been awarded a contract at about \$425,000 for erecting two factory buildings at San Pedro for the Pacific Coast Borax Co. Albert C. Martin, 430 Higgins Building, architect. The contract includes concrete foundations which were figured separately. The main building will be 3-story, 250 x 400 ft., and is designed for 5 stories. It will be class A reinforced concrete foundation. The boiler house and machine shop building will be 1-story and part 2 stories, 60 x 140 ft., steel frame and roof trusses, concrete walls.

Colo., Denver—A completely electrified 150-ton ice plant will be constructed here by the American Refrigerator Transit Co. at a cost of \$300,000, to provide service for fruit and vegetable shippers in the mountain region. According to the announcement of H. B. Kooser, president and general manager of the company, similar plants will later be built at Pueblo and Grand Junction, Colo.

Idaho, Montpelier—The Miles Milling & Elevator Company of this city, of which Frank Miles is manager, has completed plans for the erection of a modern milling plant in Montpelier, and work on the structure will begin in a few days. The building will be four stories, 30 x 40 ft., and will be built of reinforced concrete.

Ore., Salem—A cannery is to be built this season, the site for which has been purchased at Salem and the plans have been accepted. \$75,000 has been raised to be used for the building and the purchase of the site, which is located just north of and adjoining the railroad and side of Mill Creek in Salem. This is to be known as a five-line cannery and will handle about 250,000 cases of canned products.

Ore., Astoria—Harry A. Flood, vice-president of the Consumer's Central Heating Company of Tacoma, is planning to make surveys preliminary to the building of a plant in Astoria. The cost is estimated at \$100,000.

Ore., Salem—Contract has been awarded to Van Patton & Son of Salem for the erection of a 3-story steel frame digester building, to be built at Salem City for the Oregon Pulp &

Paper Company. It was planned by Knighton & Howell of Portland and will be 40 x 50 ft. in size, costing \$50,000.

Ore., Hillsboro—The Ray-Mailing Cannery is to make some improvements to the plant, costing approximately \$50,000. A 2-story addition to the present plant will be built, 80 x 85 ft. The plans were drawn by C. F. Noakes.

Utah, Magna—Construction of flotation units at the Magna mill of the Utah Copper Company will be completed as rapidly as possible, so that the mill can be brought to capacity production this year, according to D. C. Jackling, managing director and vice-president of the company, who was in Salt Lake City on a tour of inspection during the latter part of March.

Utah, Salt Lake City—The N. O. Nelson Manufacturing Company, a plumbing concern of St. Louis, will erect a large warehouse in Salt Lake City, to cost approximately \$125,000, according to plans and specifications prepared by Scott & Welch, architects of this city. The building will be 150 ft. long and 55 ft. wide. It will contain five stories, a basement and mezzanine. It is expected to be ready for occupancy by September 1.

Wash., Spokane—Plans for the construction of an oil refinery here, estimated to cost \$200,000, have been announced by J. P. Graves.

Wash., Puyallup—The Pacific Coast Canning Company is planning to spend \$50,000 in improvements to its packing plant.

Wash., Wenatchee—A contract has been awarded by E. F. Gadman for the construction of a 1-story and basement modern warehouse on Kittitas Street, to cost \$40,000.

Wash., Seattle—The J. W. Kobi Co., shampoo manufacturers, recent purchasers of the entire block fronting on the east side of Rainier Ave. between Weller and Lane Sts., plan to improve the property with the erection of a modern factory costing approximately \$50,000.

Wash., Okanogan—The Boston-Okanogan Apple Company is planning improvements to include packing sheds and storage for the current year at an estimated cost of \$60,000.

Wash., Seattle—The Western Pipe & Steel Company, whose plant was swept by a \$75,000 fire recently, will immediately rebuild, at a cost approximating that sum.

Wash., Washougal—The plant of the Washougal Woolen Mills was partly destroyed by fire recently, with a loss of \$125,000. Plant is to be rebuilt at once. One hundred and fifty men are employed.

Wash., Seattle—The Washington Iron Works, now building a \$275,000 plant in Seattle, will build an additional machine shop, the structure to be 126 x 572 ft., costing \$75,000.

Buildings (Miscellaneous)

Calif., San Francisco—Newspaper Plant—M. H. DeYoung, owner of the San Francisco Chronicle, has announced plans for a new structure to be erected at Mission and Fifth Streets. The building will be three stories, of reinforced concrete construction, each floor to be 265 ft. in length by 160 ft. in breadth, giving each story a total floor area of 42,300 sq. ft. The street floor fronting on Mission Street will be reserved for stores, the remainder of the building to be devoted exclusively to the production of the Chronicle.

Calif., Los Angeles—Stores—Theater—Architect Elmer Grey, 623 Bank of Italy Bldg., associated with Littleton Co. of Pasadena, is preparing working drawings for the store and theater building to be erected at Pasadena, at corner of El Molino Ave. and Colorado Street, for Pasadena Community Theater Association. The Littleton Co. will be the contractors for the erection of the buildings. There will be an auditorium to seat 7,000 people and a patio with shops along two sides. The auditorium will be

class A reinforced construction and the shops class C brick construction; plaster exterior, clay tile roofing, etc. The building will be 110 x 195 ft. The cost will be \$200,000.

Calif., Los Angeles—Stores—Offices—Barrett & Hilp, San Francisco, were low bidders at about \$126,000 on the general contracting for erecting a 2-story brick store and office building at northeast corner 7th and Alvarado Streets, for the Owl Drug Company. Ward & Blohme, San Francisco, architects. Building will be 172 x 71 ft. with a wing 63 x 72 ft., and will contain 15 stores and 34 offices; brick walls, plastered exterior, cast stone trim, plate glass, reinforcing concrete lintels, composition roofing, pine trim, gas heating. The total cost will be about \$160,000.

Calif., Torrance—School—Darrell Condey Co., 520 Marsh-Strong Bldg., was low bidder at \$152,000 on the general contract for erecting new high school building at Torrance. Farrell & Miller, Western Mutual Life Bldg., architects.

Calif., San Francisco—Offices—The Pacific Telephone & Telegraph Company has purchased the property at Bush and Larkin Streets, where a telephone building will be erected to care for subscribers in that district. The initial building will cost about \$300,000; ultimate construction cost is estimated at \$1,000,000.

Calif., San Jose—School—Sample & Cody, of San Francisco, have been awarded general contract for the new \$205,000 building addition to the San Jose State Teachers' College. The building will be of Spanish architecture, having two wings of two stories each, connected by a corridor.

Calif., Woodland—School—Contract for constructing the Esparto Union High School, for which bonds were recently voted, has been awarded to Gould & Johns, of Stockton, on a bid of \$86,387. The building is to be of brick, with 11 class rooms and an auditorium.

Calif., Visalia—Offices—Contract for the erection of the Security Title Insurance and Guarantee Company \$60,000 building here has been awarded to Edgar G. Noble.

Calif., Oroville—Lodge—The Oroville Lodge of I.O.O.F. is planning the construction of a 3-story building to cost approximately \$250,000. Work will commence within the next few months. Louis Riley is making arrangements for the purchase of a lot at the corner of Bird and Meyers Streets where the new building will be located.

Calif., Los Angeles—School—J. C. Bannister, 903 N. Mariposa Ave., was low bidder at \$122,177 on the general contract for erecting a new school building at Glassell Park school site. Edward Cray Taylor, architect, Ellis W. Taylor, engineer.

Calif., Santa Barbara—Institution—Architects Soule, Murphy & Hastings, 1206 State Street, have been instructed to proceed with plans for the new St. Vincent's Orphanage building. It will be 3 stories with two 2-story wings. Estimated cost, between \$300,000 and \$350,000. In addition to the main building there will be power house, laundry, home for employees and a school building.

Calif., Riverside—City Hall—The election to vote on \$100,000 bond issue for new city hall will be held May 4. The building will cost \$93,000 and equipment \$7,000.

Idaho, Caldwell—New buildings to cost \$140,000 are to be constructed for the College of Idaho. The new Science Hall will cost \$75,000 and the gymnasium will cost \$65,000, this latter to serve as an assembly hall seating 1,500 people, and will house the music department and the central heating plant for all the college buildings.

Ore., Portland—School—The contract for the construction of the new Multnomah School has been awarded to Waale Shattuck Construction Company on their bid of \$94,377.

Journal of Electricity and Western Industry

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May 1, 1923

San Francisco

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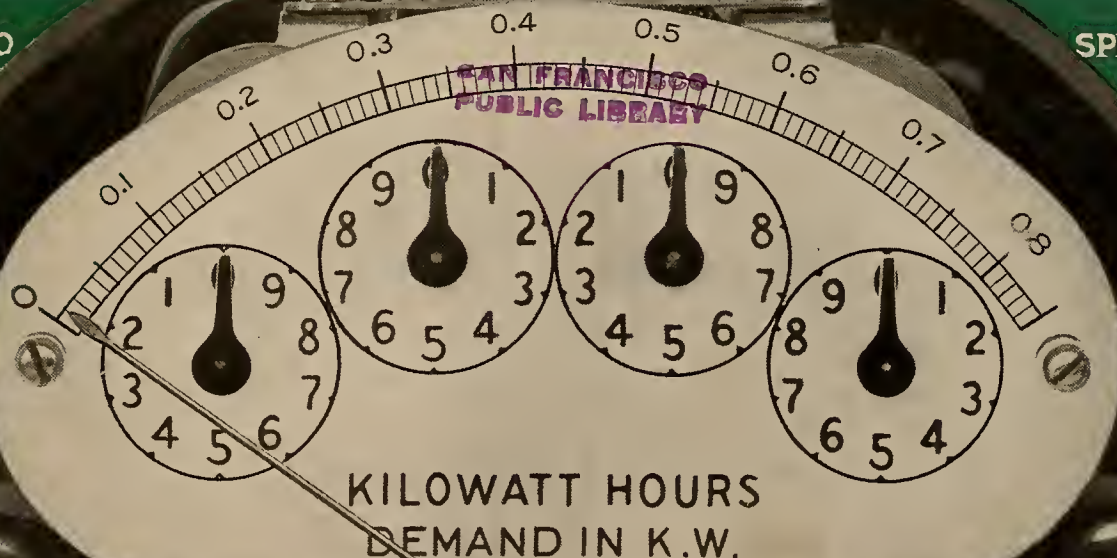
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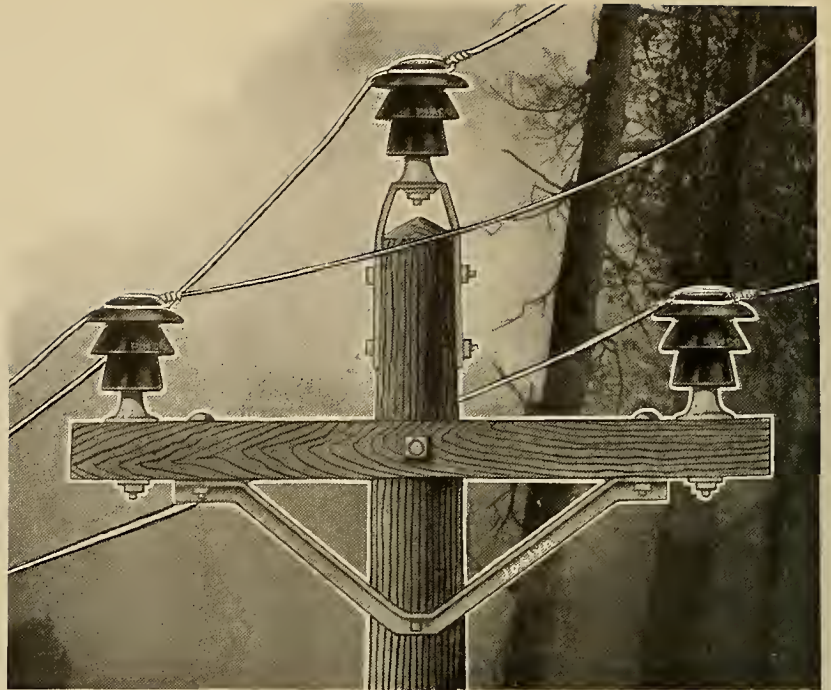
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A SERVICE FOR THE ELECTRICAL CONTRACTOR..... 331

Recognizing the need for a common forum for the interchange of ideas in the electrical contracting field, the Journal of Electricity and Western Industry is publishing a series of articles by E. Earl Browne, a recognized authority on electrical construction, the first of which appears in this issue.

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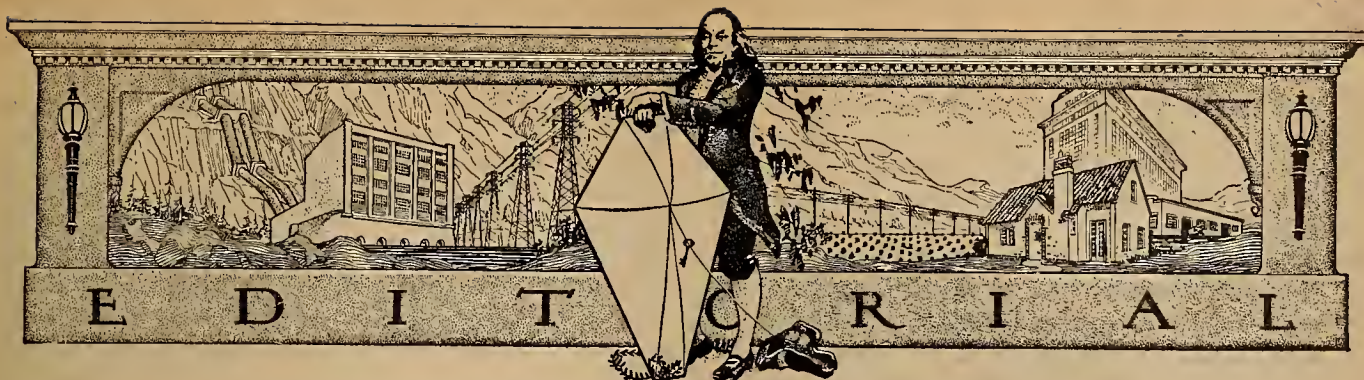
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Immigration and the Labor Shortage

INDUSTRY has been complaining of a shortage of labor, not so much in the skilled crafts but in so-called "common," or unskilled labor. Judge Elbert H. Gary, of the United States Steel Corporation, has attributed this shortage to the operation of our new immigration laws which limit the number of immigrants admitted into the United States within a year to a certain percentage of foreign born residents already here.

IT WAS the obvious purpose of the immigration laws to limit the influx of foreigners, especially those of a certain type, in order to prevent the competition of "pauper" European labor with that of American citizens whose standards of living demanded relatively high wages. Unquestionably the law has done this, but with a vengeance.

IT LOOKS as if the shrewd political heads governing the affairs of organized labor had put one over on Uncle Sam, American industry, and the American people. In effect, the present immigration laws make of the United States a great closed shop, as far as the rest of the world is concerned, while those in possession of the field, organized labor, with their restrictive regulations regarding apprentices, output, and admission of additional members of the unions, have almost absolute control of the supply of labor, than which a more destructive condition could hardly exist.

FOR many years to come, we must of necessity rely upon Europe for our supply of unskilled labor. The conditions of life in the United States, the rapid industrial development bringing opportunity to all who are willing to exert themselves, bring about a decided upward step educationally and economically with each succeeding generation. The son of the immigrant who worked with his hands is not content to follow in his father's footsteps. There are no unwritten laws of caste, that produce such things as four generations of butlers, or serving maids, a condition that is quite a matter of course in Europe. The history of industry is replete with incidents where many of the leaders of today are the sons or grandsons of uneducated steerage passengers.

MR. GOMPERS is railing at Judge Gary's analysis of the fundamental cause of our labor shortage, but railing does not dissipate facts. Pursued to its ultimate conclusion, we might conceivably look forward to the time when we have an industrial organization consisting of leaders with no one to lead, like the Mexican army, all generals and no privates.

A SANE revision of the immigration laws, by which the undesirables might be weeded out at the source, and that would permit of the admission of a supply of labor sufficient to keep pace with our industrial development is needed, and at once.

Super-Power Survey of the Pacific Northwest

THE Super-Power Survey of the Pacific Northwest, which is published in full in this issue, is one of the most important documents concerning the electrical development of this region that has ever been compiled. Prepared by an impartial committee of representative engineers, after careful study covering a two-year period, the conclusions reached may be regarded as authoritative as well as informing.

The purpose of the report was to obtain reliable data to be made available to the public, to capital, to existing and future operating companies, to industries and to commercial and legislative bodies; and to further industrial development by an attempt to forecast and indicate such methods of power expansion, development and interconnection as may ultimately prove sound. A careful perusal of the document is convincing that the committee has succeeded admirably in its work.

Interesting among the several findings of the committee are the statements that development work has been consistently carried on without unnecessary duplication; that power which can be economically exchanged between the several groups can be carried on over ordinary transmission lines already built or likely to be built in the future; and that super-power construction to save fuel or equalize unbalanced power conditions can be avoided for a long time in the Pacific Northwest.

Should sufficient demand be apparent for this document it will be reprinted and distributed in pamphlet form. Those interested in securing copies should communicate at once with any of the commercial bodies in the states of Oregon, Washington or Idaho.

For purposes of facilitating the mechanical composition of the report, the order of presentation has been changed in publishing. The material appearing under the caption "appendix" was submitted as the introduction, also the illustrations have been furnished by the Journal of Electricity and Western Industry. It was thought by this arrangement that the survey would be made more attractive.

Trite but True, "It Pays to Advertise"

IN "Pickwick Papers" Dickens tells how Sam Weller polished Mr. Pickwick's boots at the Whitehart Hotel with Day & Martin's shoe polish. Carlyle, George Eliot, Tom Hood and Bret Harte in their writings also refer to the polish made by this firm. Yet just a few weeks ago, Day & Martin, one of the oldest and most famous manufacturers of shoe polish, sold out because, as the managing director says, "we didn't keep up our advertising." In former years the company advertised as extensively, perhaps, as any other concern in the country. Its products were so well known that a corps of noted authors made frequent references to them. But someone fell down. They forgot about advertising. They forgot that a product may be famous today

and forgotten tomorrow just for a lack of advertising. They paid no heed to the derelicts on the industrial shore that had gone to their doom for the same reason. "Sunny Jim" was a household phrase ten years ago,—forgotten now. There are many other examples which bear out the truth that a product must be kept before the public every day in the year. To witness the passing of one of the old lines may bring a pang of regret, but it also brings home the truth in the statement that "It Pays to Advertise."

Our New Department Devoted to Electrical Construction

THE present chaotic condition of the electrical construction field is due largely to competition on a price basis. Unscrupulous price-cutting has in many cases been ruinous to the contractor and has resulted in unsatisfactory installations from the consumer's point of view. The public is generally ignorant of electrical construction and naturally wants connections and service at a minimum cost. The electrical contractor is often misled as to his costs of doing business and has few means of keeping abreast of the latest methods whereby his costs may be reduced. Where the capacity of lines and number of outlets is cut down to make possible a low contract price, the contractor suffers in that the sale of current consuming devices is checked, and the consumer does not receive the full value of the progress of the electrical art to which he is entitled.

The Journal of Electricity and Western Industry has long realized the need of establishing a department devoted to a discussion of problems of the man engaged in electrical construction. Our task has been to find the right man to conduct such a department. As is formally announced on page 331 of this issue, we have been fortunate in securing a man whom we believe to be exceptionally well fitted to undertake this work. We believe that Mr. Browne's articles will be a distinct contribution to the all too meager literature on this subject.

Every agency profits in proportion to the service it renders. This series of articles should be of incalculable benefit to the electrical contractor. The contractor controls the "neck of the bottle" in the electrical industry. His elevation to a position where he can do dependable quality work at a profit will be reflected in increased sales and increased profits to the rest of the industry.

Community Prosperity Determines the Success of the Public Utility

PUBLIC utility officials realize that the growth and success of their companies is dependent upon the prosperity of the people in the territory which a utility serves. The San Joaquin Light & Power Corporation recently demonstrated its appreciation of this fact in a striking manner. A stock sales campaign for the sale of San Joaquin Light & Power Corporation preferred stock was launched the first week in March after several weeks of preliminary preparation.

The campaign originally was planned to extend over a period of ten months, beginning March 15, to sell to the public \$2,000,000 in prior preferred stock. This campaign was getting started nicely when it became evident the drive of the Sun Maid Raisin Growers' Association would require the undivided attention of every investor and individual in the San Joaquin Valley if it was to be made a success.

In line with the support given the Sun Maid Growers' drive by progressive business interests in the San Joaquin Valley, the management of the San Joaquin Light & Power Corporation declared a postponement in the sale of San Joaquin Power Stock for a period of one month. In addition, the power company, through its district officials and by advertisements, further assisted in the refinancing.

While in the final analysis this public utility was best serving itself by assisting the raisin growers, and claims no halo for its actions, nevertheless the important thing is that it saw the opportunity to perform a helpful service to the community and acted immediately.

Puncturing the Excessive Cost Bubble in Electric Home Operation

IF ONE may be permitted to paraphrase a famous saying of Huxley, many an ugly theory is wrecked by a beautiful fact. Mr. H. L. Garbutt has supplied the beautiful fact in his article elsewhere in this issue, on the operating cost of an electrical home.

He points out, justly, that the greatest single obstacle in the way of the electrical home is the element of operating cost. This applies particularly to the range, and electric heating. Heretofore, specific data on this all-important subject have been all too scarce, especially data covering a term of years long enough to be convincing.

The impression has been general that the range and the electric heating appliances are luxuries for the rich only, that only the man of relatively large means can stand the excessive operating cost for the sake of the admitted convenience, flexibility and cleanliness offered by electrical heat.

Here, then, is a specific instance that disproves this theory. A five-room bungalow in San Francisco, based on continuous operation for a period of three years, cost \$13.88 per month for electric cooking, heating, lighting, washing ironing, and machine sewing.

Mr. Garbutt has done a real service to the trade in making these figures public. We are indebted to him for this beautiful fact, upon which the ugly theory of excessive cost of operating an electrical home is wrecked.

Annual Summer Convention of A.I.E.E. at Swampscott

ELECTRICAL engineers who will be in the eastern states during June should plan to attend the annual summer convention of the American Institute of Electrical Engineers, from June 25 to 29, when New England's lathstring will hang outside

the door at Swampscott, Mass., about fifteen miles from Boston and on the famous North Shore of the Bay State. The local convention committee has been very active in its preparations and has organized an attractive program of work and play for visiting delegates and guests. Local industrial plants, educational institutions and utilities are anticipating visits from many convention attendants; trips to the numerous historic and scenic attractions of eastern Massachusetts are in contemplation, with an attractive program of sports and papers of significance to physical and engineering phases of electrical activity.

The keynote of the convention will be advances in equipment and plant design. Among the subjects to be covered will be modern developments in rectifiers; researches conducted upon the nature of insulation failures; artificial transmission lines; electric plants for commercial radio; transmissions and distribution; a new type of lightning arrester; lamp quality; and street lighting. Electric welding will be considered, and other papers promised which may be included in the schedule, bear upon heat balance and plant economy, duplication of electrical equipment, instrument specifications, and electrical instruments.

Plan Better Lighting in Schools to Save the Eyes of Youth

THE lighting, building, education, health and social agencies of the country have joined hands in an effort to develop a nationally accepted code for school lighting which will correct the conditions partially responsible for the defective vision of 10 to 20 per cent of the school children.

The formulation of this code is being carried on under the auspices of the American Engineering Standards Committee, a federation of national organizations, government departments, and other agencies interested in standardization, whose official approval of a standard or code insures its ultimate acceptance by the principal interests concerned.

The conditions that make such a code necessary have been summarized as follows by a committee of the Illuminating Engineering Society:

"Examinations of thousands of school children, extending over many years, have shown that from ten to twenty per cent of the children suffer from defective vision, the result largely of continued use of the eyes in close work under unhygienic conditions. It is well established that defective vision is progressive and is therefore found to a larger extent among the older children.

"Economically, it is found that, in general, children with defective vision are retarded in their progress in school life, and also enter upon their life work seriously handicapped. It is right, therefore, that a state should concern itself to protect and conserve the vision of children from an economical, as well as a humanitarian standpoint."

The American Engineering Standards Committee has appointed the American Institute of Architects and the Illuminating Engineering Society joint sponsors for the code in school lighting.

CURRENT COMMENT



In its campaign with architects, the Denver Electrical Cooperative League has stressed the point that no matter how large an architectural firm is or how progressive, adequate treatment can not be given to all phases of building lay-out and equipment by the general architect and draftsman, without the assistance of a specialist. This has been found especially true, according to reports of S. W. Bishop, executive manager of the Denver organization, in the handling of electrical matters. Some architects have made it a practice to call in consultation competent electrical contractors, and other skilled engineers, while the majority have depended solely upon the qualifications of the established staff, which in few cases included domestic engineering specialists.

The League, not wishing to enter into competition with the specialists, has extended its cooperation and help to them as well as to the architects willing to avail themselves of the services of the organization, and it was found that many smaller architects eagerly sought assistance after it was learned that the larger firms were calling on the League.

That there is a growing appreciation of this need of specialized service is reflected in the statement of F. H. Willis, a prominent engineer associated with one of the largest architectural firms in Denver, in the Colorado Engineers Bulletin:

"Fifty years ago an architect was supposed to be an authority on all matters of building construction, but hand-in-hand with the wonderful progress of recent years has arisen such a complication and array of mechanical equipment entering into the average building that today no man may hope to be proficient in all the details thereof.

"Such matters as general power plant equipment, heating, ventilating, plumbing and electrical works, or, in a word, the domestic engineering sciences, constitute a specialty in themselves, the mastery of which, even in a most general way, requires many years of study and practical experience.

"And so, as year by year the confusion and uncertainty as to choice of methods has multiplied, and as the architect himself has been more and more obliged to specialize, leaving many things to his subordinates, there has grown up an insistent demand for a more careful treatment of the engineering features—for a simpler, better and more efficient equipment, and hence, the demand for consulting engineering services.

"And just as it is impossible to find in any one man the training and experience requisite to the perfection of a high-class architect and an equally high-grade engineer, so no one man can ever aspire to proficiency in all the various branches of engineering. That is why the man who engages in consulting domestic engineering practice should adopt a form of organization which will enable him to attract to his staff men who are skilled in different directions, and to sell their services without imposing upon the client the necessity of dealing with a number of engineering heads."

Activity of production and trade, which has been marked since the first of the year, was sustained during March, with records of previous years being steadily approached or exceeded

Federal Reserve Bank Reports Trade Activity in numerous lines of activity, according to the monthly report on business and agricultural conditions issued by the Federal

Reserve Agent of the Federal Reserve Bank of San Francisco. The report states further that labor is fully employed and wages are advancing. Substantial increases in rates of pay in the lumbering, mining and metal trades industries were announced during March. Farmers in many sections are having difficulty in securing adequate help for spring planting and cultural work, because of the relatively low wages paid agricultural laborers. Practically all of the lumber mills of the district are now in operation, and production during March was estimated to be 10 per cent above normal for that month. The volume of orders received and shipments made continued greater than production. Output of the mines of the district increased, the metal market continued active, and prices of the principal metals produced, except silver, rose. Building permits issued during March were greater both in number and value than in any previous month of which there is record. There were 13,358 permits authorizing construction valued at \$40,203,440 issued in 20 reporting cities.

The general price level continued upward during the month. Prices of many agricultural products of the district, however, are now lower than one year ago, the principal exceptions being wool, cotton, sugar, and barley, all of which are selling at prices considerably above those of April, 1922. Prices for lumber, copper, lead, and zinc advanced during the past month.

Crops and livestock of the district are reported in good condition. The past winter has not been

severe and early spring weather has been generally favorable. Rains during the first week of April ended a six weeks dry spell in California, relieving a situation which was becoming serious.

Engineers of the Pacific Gas & Electric Company have put into successful operation what is known as the "Directed Wireless System of Dispatching."

Utility Uses Messages were transmitted between the Vaca-Dixon Substation, near Vacaville, to the Pit River power house, some two hundred miles apart. Specially constructed 500-watt sending sets and the standard Kennedy universal receivers were used. Sound waves are transmitted to the high voltage power lines at the point of sending and picked off at the receiving end. These sound waves follow the course of the steel tower lines in a straight line due north one hundred and twenty miles from Vaca-Dixon to Cottonwood, thence on a right angle turn going eighty miles into the Pit region. Tests were made at from 10,300 to 23,000 meters. Under this system of directed wireless the energy or sound wave, is not broadcasted, but travels in the vicinity of the high powered transmission lines, and will not interfere with other sending or receiving stations.

Engineers state that this is the longest system of its kind ever operated. It will be used for transmitting messages between power houses in the mountains and large centers of distribution. This system will be especially valuable in maintaining a continuity of service during heavy storms when telephone lines and other systems of communication are unavailable. The tests were made under the direction of J. P. Jollyman, chief of the division of hydroelectric and transmission engineering of the Pacific Gas & Electric Company.

A similar "wired wireless" or "carrier-current" system of dispatching has been in operation for several months on the lines of the Great Western Power Company between San Francisco and one of the company's main power houses at Caribou, on the Feather River, a distance of 168 miles.

The improvement in general business conditions the country over is reflected in the great amount of freight business handled by the railroads in recent months. One of the country's

Car Shortage leading authorities on the railroad situation, who recently toured the West investigating railroad conditions, is credited with the statement that * * * business will be restricted by the shortage of transportation unless the public will cooperate by loading all cars to maximum capacity, loading and unloading them promptly and providing more adequate storage facilities for themselves, and that road and building construction material should also be shipped as early in the season as possible.

Despite the fact that the railroads have added considerably to their facilities and equipment and have improved their organization during the past two

years they are unable to cope with the situation. For weeks they have been loading well over 900,000 cars of revenue freight per week, an increase of from 13 to 20 per cent as compared to the previous five-years' average for the corresponding weeks. Conservative estimates are that the peak load this year will reach 1,085,000 cars next October—an increase of 7 per cent over the maximum for 1920, the banner year.

No business man can afford to overlook his duty in helping in this crisis. Acute shortage of transportation even if it may not seriously hurt him directly, will so affect general business as to react to the disadvantage of the entire community.

Three applications for permit or license under the Federal water power act were filed with the Commission during the two weeks' period ended March 31, 1923, making a total of 402 received to that date. Application

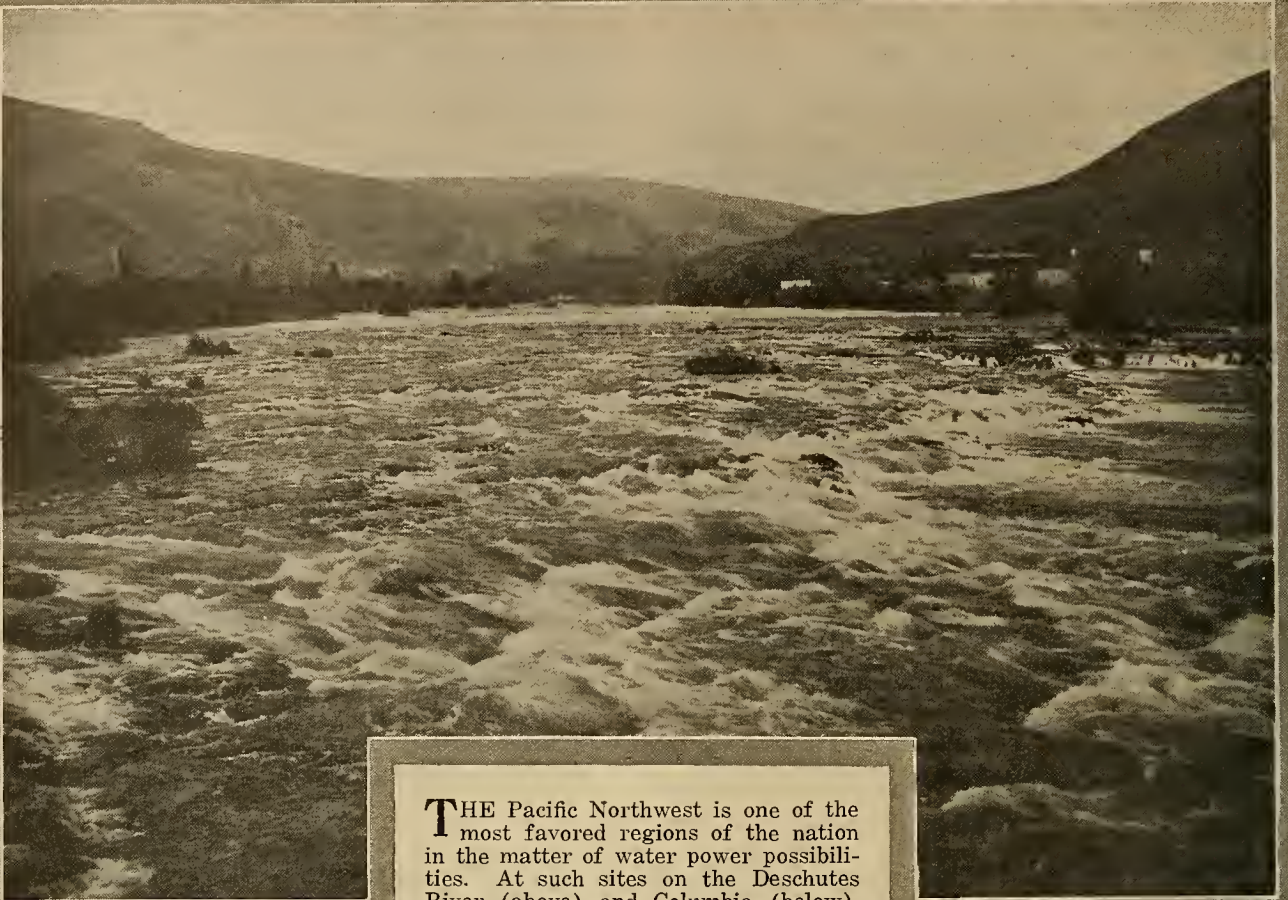
Four Hundred Federal Power Applications No. 400 was placed by the Western Colorado Power Company, being an application for a license

for four of its constructed plants in southwestern Colorado known as the Tacoma, Old and New Ames, Ilium and Ouray projects, on Animas, San Miguel and Uncompaghre Rivers. It has also applied for a license for the sections of its transmission system on public lands and national forests. The combined capacity of the plants is approximately 15,000 hp. and about 180 miles of transmission line are involved. This power system supplies the mines in the region of Durango and the public utility load in that section.

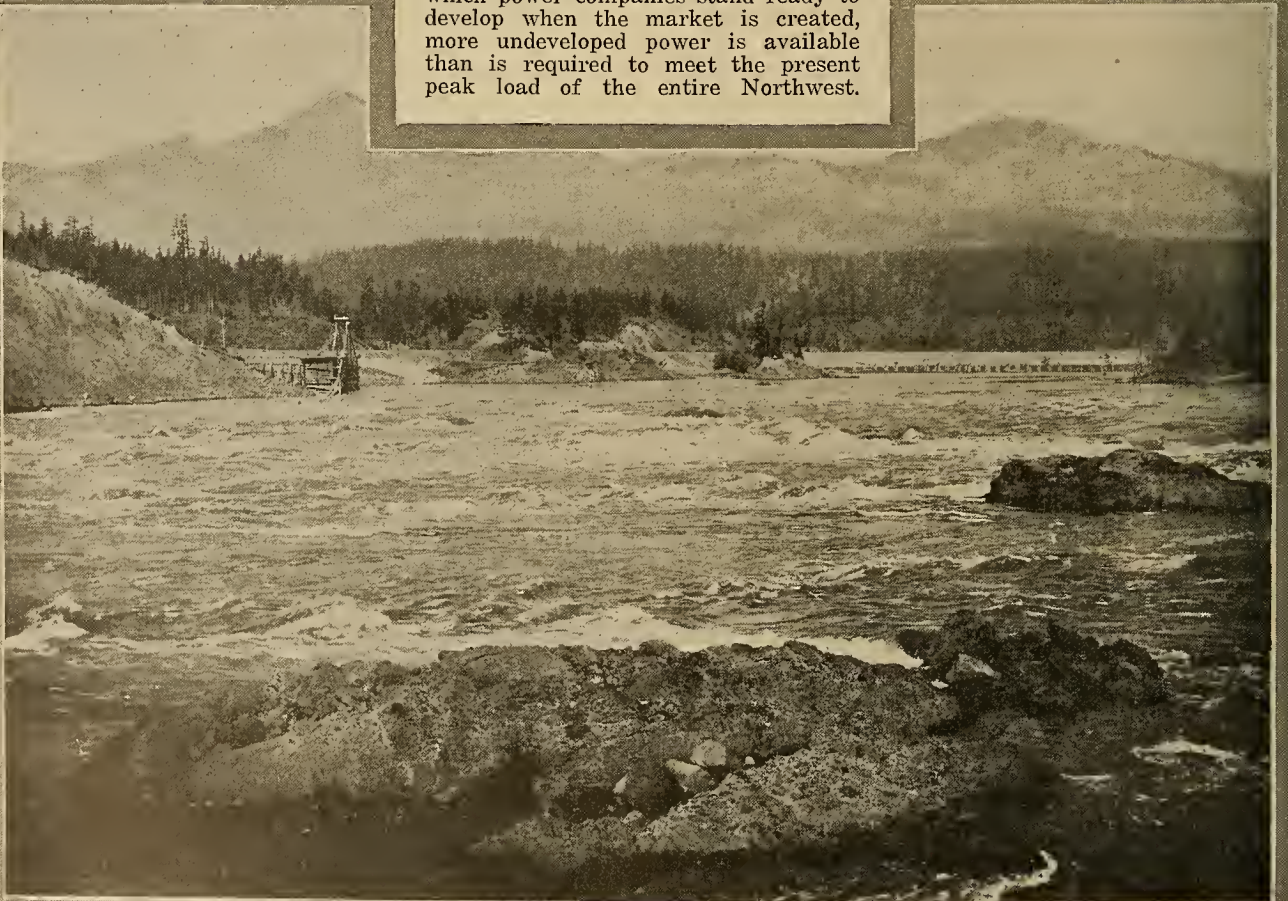
The number of applications for permit or license under the Federal water power act has now passed the 400 mark. These applications have been received at the average rate of three per week since the Commission was organized in the summer of 1920. They aggregate the enormous total of 13,375,000 primary horsepower and involve an estimated installed capacity of 22,154,000 hp., or approximately two-thirds of the total capacity of both water wheels and steam engines used for public-utility and industrial purposes in the United States at the present time. These applications embrace water-power enterprises of all sizes, from individual plants of less than 100 hp. to great interconnected systems involving hundreds of thousands of horsepower.

The Federal Power Commission is entrusted with the responsibility of acting upon these applications and determining to whom authorization for power developments shall be given and upon what conditions. The responsibility of administering interests such as these is one of the great undertakings of our day; but unfortunately it has not stood out with special prominence,—a fact which has resulted in a somewhat inadequate appreciation of its importance.

Although seriously handicapped by lack of personnel and of appropriations—\$40,000 only having been given for 1923—the Commission has taken action upon 70 per cent of these applications, one-tenth having had to be indefinitely suspended until further action by state or international agencies, and only one-fifth now await action by the commission.



THE Pacific Northwest is one of the most favored regions of the nation in the matter of water power possibilities. At such sites on the Deschutes River (above) and Columbia (below), which power companies stand ready to develop when the market is created, more undeveloped power is available than is required to meet the present peak load of the entire Northwest.



Super - Power Survey of the Pacific Northwest

THE mountainous character of Washington, Oregon and Idaho combines with the heavy precipitation on the higher altitudes to render the northwestern part of the United States one of the most favored regions in the matter of water power possibilities. A report made a year ago by the U. S. Geological Survey on water power available in various parts of the country shows that the three northwestern states under consideration, having a population of not over 4 per cent, contain water power possibilities amounting to 38 per cent of that of the entire United States. These power possibilities occur both on the steep tributary streams and on the main rivers. The tributaries and the upper portions of main rivers have been logically utilized first by reason of low initial investment, which permitted expansion by successive steps to keep close pace with the steady growth of the power market. The natural expansion of present systems has generally followed in this direction. The general characteristics of developments on the tributary streams are a multiplicity of plants with relatively small flow and high heads, in which the aggregate possibilities are very large. For example, on the lower Deschutes River alone there is more undeveloped power available than is required to meet the present peak load of the entire Northwest.

Recent official reports indicate that there can be made available at known power sites on Clarks Fork, Lower Snake and Columbia Rivers between four and five millions of primary horsepower.

Power on main rivers is to be derived from

THE accompanying report was prepared by a group of representative engineers in educational institutions, in private practice and in municipal and private utilities, after an exhaustive survey covering a two-year period, through various engineering organizations acting in conjunction with the Chambers of Commerce of the Northwest. It presents a graphic picture of the present electrical development of Washington, Idaho and Oregon and its relation to their future growth.

large volumes of water under relatively low heads. Development of some of the more favorable sites of this character is already under serious consideration.

The importance of great power possibilities in the Pacific Northwest upon its general development can hardly be overestimated. In other parts of the United States limitations of water power possibilities are being sensibly approached, because the cost of power from such developments is

so great that it will not compare favorably with the cost of power produced by fuel. On the other hand, the Pacific Northwest is subject to no such limitation and the abundance and reliability of its water powers are vital factors in its commercial, agricultural and industrial expansion, which, as yet, has hardly begun.

By a "Super-power" line is meant a large capacity high voltage transmission line into which practically all plants feed and from which practically all commercial power is drawn. Interconnection of one group with another by ordinary moderate capacity lines for the mutual transfer of energy under sale contracts is not included in the term "Super-power" line. Such connections now exist and it is assumed that the interconnection of the various existing systems will be made whenever there is mutual advantage to be derived therefrom.

Super-power lines involve a large expenditure which can be justified only by unquestionable benefits. These may consist of greater insurance against interruption of service or of lower cost of delivered power.

In the early days of power generation, interruption of service was a serious factor. With the growth of the power business, this factor has become greatly minimized, through interconnection of individual systems and the establishment of a network of transmission lines of sufficient capacity to perform emergency service in case of a local breakdown. It is these networks of lines of varied capacity which have permitted a division of the entire field here considered into five groups. Within each group, every reasonable precaution is being taken to avoid



One of the five Columbia River spans of the Pacific Power & Light Company, length 1,994 ft.

interruption of service. The insurance that now exists against such interruption would not be materially enhanced by the construction of super-power lines.

The cost of delivered power is the result of complex causes. The relative cost of hydro-power development in the various groups as related to the power market possibilities are the important factors which need to be considered in the study of super-power lines.

General competitive conditions have brought reasonable equality in rates in the Pacific Northwest. So far as any differences exist, they cannot be eliminated by the construction of super-power lines, because the burden of their cost must fall upon the groups least favorably situated in this respect and will be reflected in the cost of the power delivered. A resultant lowering of rates in any one group, therefore, could only be expected if the present difference in cost of group production is sufficiently great to exceed by a considerable amount the cost of providing super-power lines. This is not the case in any one instance. There is, however, advantage in exchange of power between groups in minor quantities which explains the construction now proceeding in various directions of group connections by ordinary transmission lines of moderate capacity such as do not come in the class of super-power lines.

A general benefit from super-power lines might be realized in all groups in case a seasonal excess of available hydro-power over market requirements in one or more groups coincided with a shortage in other groups, which would permit wholesale seasonal interchange and result in an improved load factor for all.

Climatic conditions in all groups so far as they

control stream flow and seasonal excess over primary or all-year power are in the main alike. There are some differences as to times when floods occur east and west of the Cascade Mountains, but these are differences of a minor character and are not such as to require or permit large exchange of power, were super-power lines built.

To those familiar with Northwestern power conditions, it has long been apparent that the most valid reason for considering super-power connection at all must be sought in the variation throughout the year of power demands as compared with hydro-power supply, and it was this phase of the subject which has received most careful consideration.

The charts shown in Figures 1 and 5 show the seasonal variation of market demands in each group. A comparison clearly establishes the fact that in all but the Snake River group the demands are lowest in midsummer and highest in midwinter, while the power supply is normally the greatest in spring and early summer. No large interchange of power between these groups can be expected under such conditions.

There remains the Snake River group (Fig. 4) with aggregate demands varying relatively little in May, June, July, August and September. During this period the demand is largely affected by irrigation pumping. After the irrigation season it drops off suddenly about 25 per cent, the lessened demand prevailing during the other seven months. It seemed at first, therefore, that a super-power connection between this and the adjoining Upper Columbia group might contain promise of economic benefit.

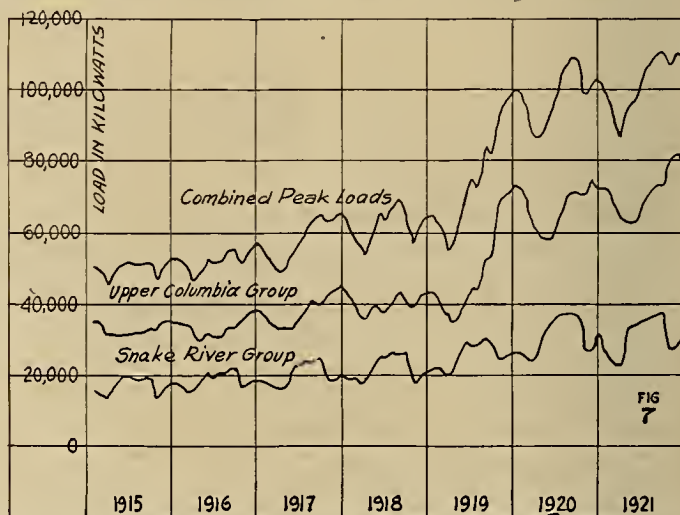


Fig. 7—Comparison of peak loads in Upper Columbia and Snake River groups. The past power demand peaks of the two groups are shown individually and combined.

In order to analyze this question, Fig. 7 was prepared, on which the past power demand peaks of the two groups are shown individually and combined. It was expected that in the combined curve a decided improvement as to seasonal variation would develop, but a glance at this curve will show that the result is disappointing. This is in part owing to the fact that the Snake River load continues high well into September, when the Upper Columbia load is already rapidly ascending to its winter maximum.

A study of consumed power in the two groups shows that, for instance, in a year like 1920, a transfer of power from the Snake to the Upper Columbia group might, so far as market demands are concerned, be beneficial prior to April 1 and after Oct.



Tolt River crossing of the Puget Sound Power & Light Company, span length 1,069 ft.

15, but not between these dates. The maximum exchange for minimizing load variation for each would have been only about 5,000 kw., an amount which must increase very largely before any economic necessity for a super-power line can exist.

The Snake River has seasonal variations coinciding in a general way with those of the power demands. This favorable coincidence may in future be made even closer through stream regulation by storage, thereby further reducing the need of super-power connection.

The group load factors are on the whole favorable and they can and will undoubtedly be improved by hydro-development within each group and by the use of storage. Super-power connection is not necessary for this purpose.

The question should be considered whether in future the limit of feasible power development may be reached in one group long before it is reached in other groups, and whether at such time a super-power connection may be warranted and may, indeed, be required to maintain healthy expansion in all groups. Water power possibilities are both abundant and evenly distributed over the entire territory and in each group there is such enormous excess remaining available, that a group shortage of supply lies too far in the distant future to require consideration at the present time.

It is conceivable that public utilities in one group might be seriously backward in making timely provisions for expansion due to gradually increasing unit cost of development or other causes. Of this, however, there is no evidence. On the contrary, the development steps already definitely planned, as shown in Figs. 1 to 6, and in large part now under way, promise to secure in all parts of the territory an abundance of power, obviating the necessity of super-power connection from this point of view.

The character of power development in the past by the utilization of tributary rather than main streams has been commented on in a previous sec-

tion. Development on main streams has lagged behind not because of high unit cost but by reason of the heavy initial investment which must generally be incurred even for the production of a small portion of the total power available. The mere cost of power dams alone at such points as Priest Rapids and Celilo Falls on the Columbia River involves the immediate expenditure of many millions of dollars.

Initial investment on such a large scale cannot be wisely undertaken without assurance of a correspondingly large immediate market. The ordinary commercial uses of power and their rapid expansion are adequately taken care of by existing utilities. Encroachment on existing markets, which, if permitted by public service commissions, might lead to destructive competition, is not a sound basis for financing such great undertakings.

It has become a well understood fact that the magnitude of such enterprises is their most serious present obstacle and that for their successful undertaking special markets must be created from the start. It is hoped that these can be found in a large increase of irrigation pumping and in the establishment near power sites of electro-chemical or electro-metallurgical industries requiring large amounts of electric power. Their commercial feasibility depends far more upon the availability of cheap raw materials and favorable freight rates to consumption markets than upon the cost of power.

Much study is being given to this problem, the early solution of which is of the greatest importance to the entire Northwest. It is desirable to consider its possible influence upon the general power situa-



Shoshone Falls on the Snake River, Idaho, before development by the Idaho Power Company.

tion and upon the advantage in that connection of super-power lines. So far as the effect of such large individual development upon existing utilities is concerned, it is believed to be favorable.

The building up of new industries must result in direct or indirect benefit to all. As regards its effect upon general commercial rates, momentary unavoidable excess development may tend to duplication of construction, which in the end would have to be paid by the public and which should therefore be counteracted by controlling state agencies. With sound financing of these large enterprises the momentary excess will be kept within reasonable limits

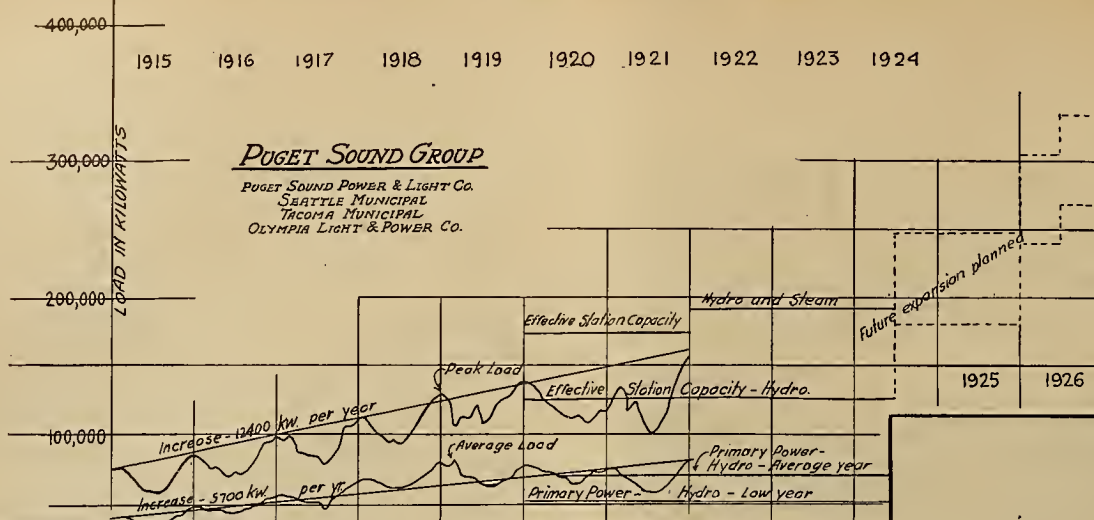


FIG. 1

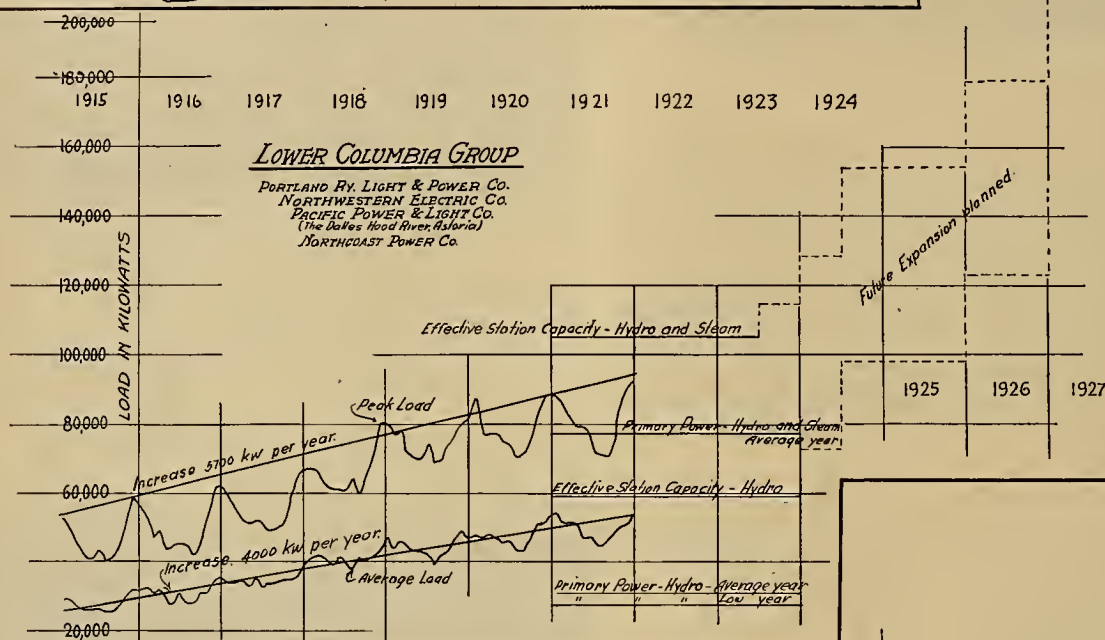


FIG. 2

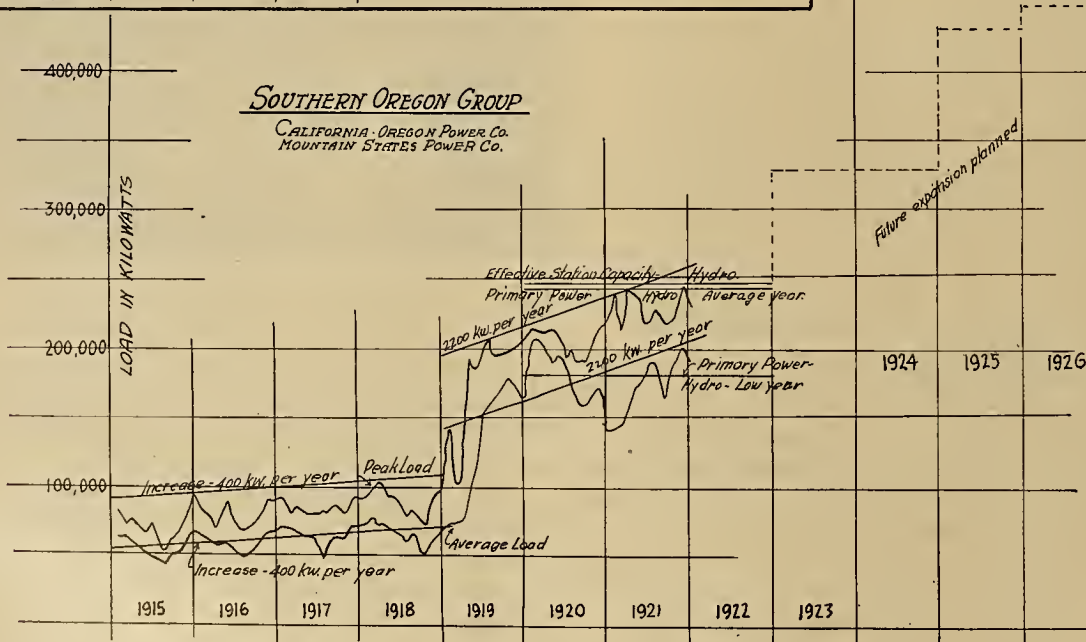
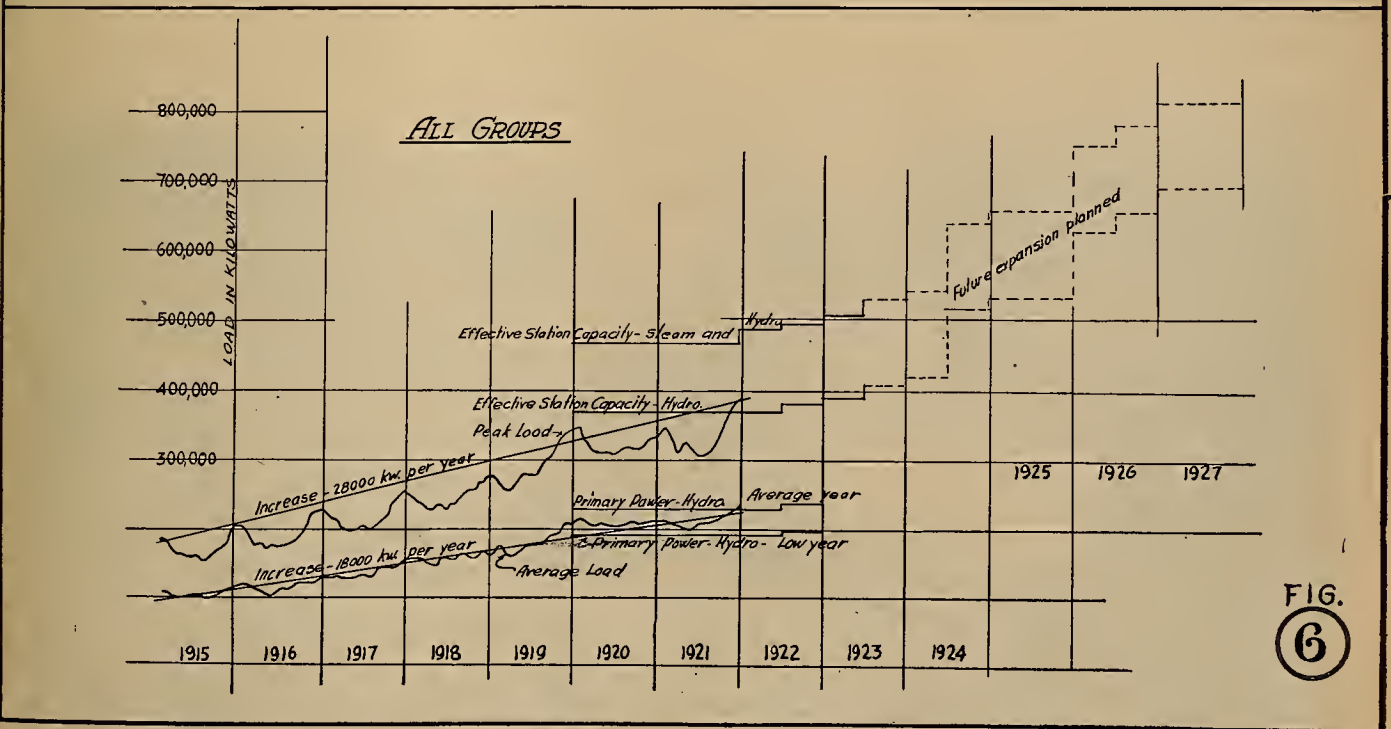
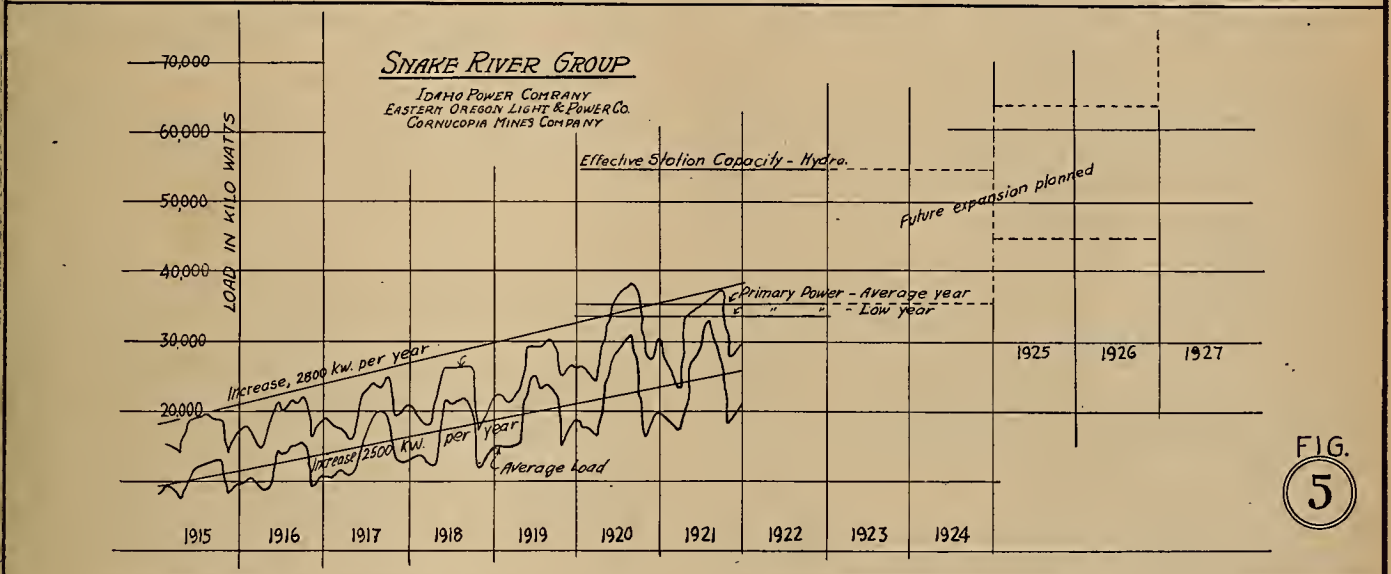
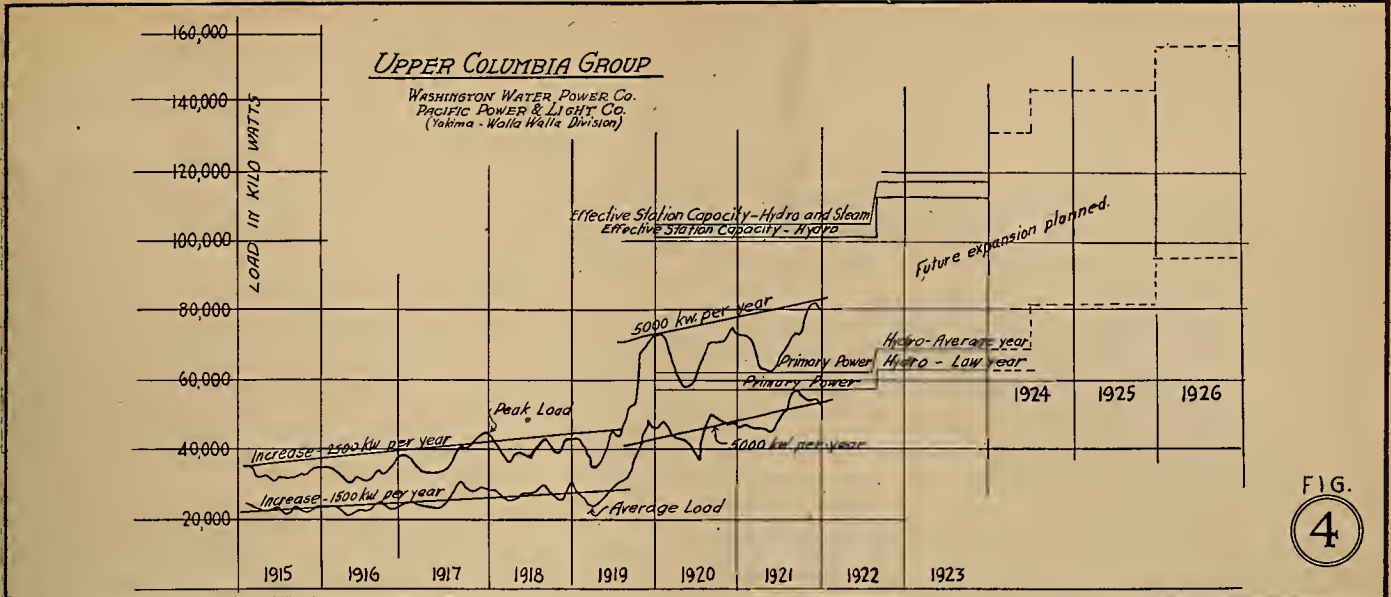


FIG. 3

The charts shown on pages 324 and 325 indicate the seasonal variation in market demands in each group under discussion. A comparison clearly establishes the fact that in all but the Snake River group the demands are lowest in midsummer, and highest in midwinter, while the power supply is normally the greatest in early spring and summer. No large interchange of power between these groups can be expected under such conditions.



Development steps, providing for future expansion, are definitely planned, and are in a large part now under way, as is shown in Figs. 1 to 6. These provisions promise to secure in all parts of the territory an abundance of power, obviating the necessity of a super-power connection caused by a group shortage. Water power possibilities are abundant and evenly distributed over the entire territory and in each group there is an enormous excess available.

and if properly handled through connections with adjoining groups will result in mutual help and benefit and in keeping rates down to a point as low as is compatible with cost of service. The connections with adjoining groups of power systems are likely even then to be in the nature of heavy service lines rather than of super-power construction, because of the small need of heavy interchange of power, owing to a well distributed surplus of power and a greater utilization of storage.

Study of super-power connection between the Northwest and regions to the south and east has not been considered as lying within the scope of this committee's work. It may be stated, however, that some power is now being transmitted to California from the Southern Oregon group over ordinary transmission lines, and that super-power lines will probably find their first application in the transfer of large blocks of power to the south and east where water power is less abundant.

Conclusions

The committee, after a careful study of the data secured, has classified the power systems of the Pacific Northwest into five major groups and has reached the following general conclusions:

1. There is a healthy increase of power demand in all groups.

2. Adequate provisions are under way in all groups to keep ahead of the estimated growing demand by the construction of hydro-plants and water storage. In the groups where steam power production is now an important element, plans provide for reduction of the proportionate amount of power supplied by steam.

3. The characteristics of the power load of each group are much the same, the maximum load occurring in the fall and winter, except in the Snake River group, where irrigation pumping produces a summer peak.

4. The need of group connection by super-power lines is at present not sufficiently great to justify the expense even in the case of a line between the Snake River and Upper Columbia groups where the advantage would be greatest.

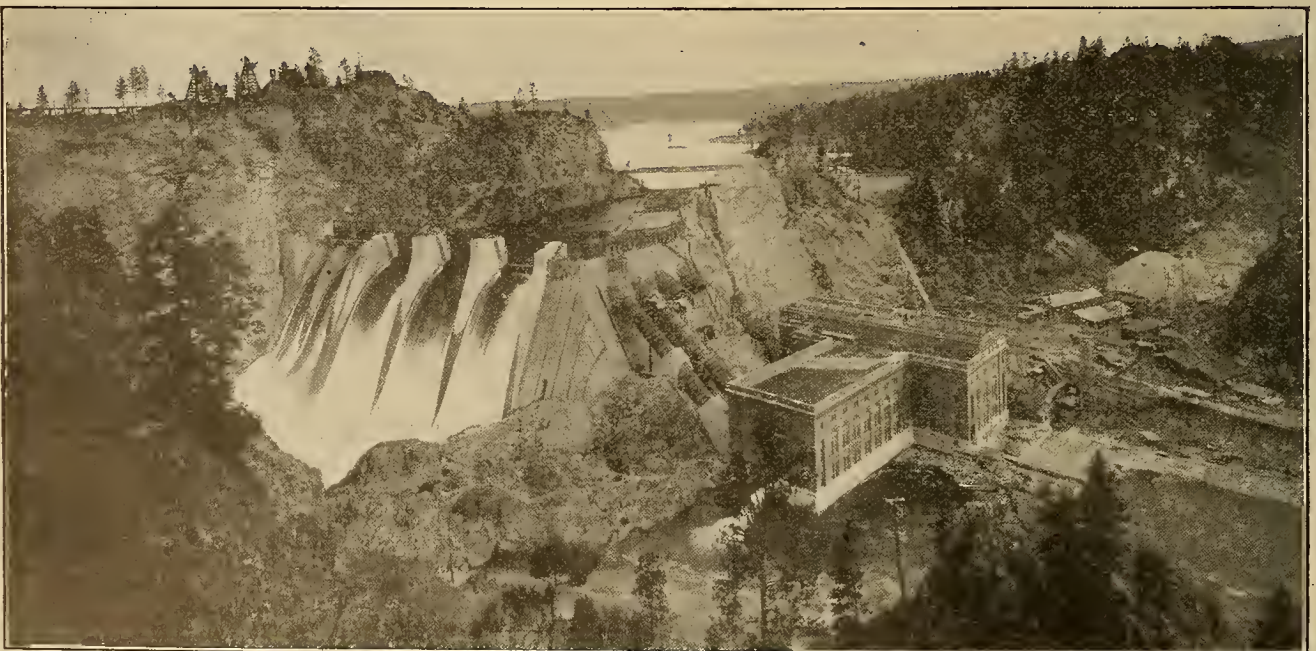
5. The power which can be economically exchanged between the several groups can be carried over ordinary transmission lines already built or likely to be built in the future.

6. Existing networks of power systems will, through natural expansion, become more closely interconnected, but super-power lines are not likely to be needed unless economical development in one group reaches its limit while great excess of power exists in other groups. Such a condition is not likely to obtain for many years.

7. Future large hydro-power development, in addition to that provided by existing systems normally expanding, is dependent upon the introduction of commercially feasible agricultural or industrial enterprises requiring large amounts of power.

8. Such power development is of the highest importance to the Northwest. If wisely undertaken, it will come as a result of newly created markets, will tend to benefit other public utilities and stabilize rates, but will not in itself require super-power connection.

9. Thirty-eight per cent of the water power possibilities in the United States are located in the area under discussion. The development work up to the present time has in the main been consistently carried along without unnecessary duplication. The expense of super-power construction, which must be incurred in other regions to save fuel or to equalize unbalanced power conditions, can be avoided for a long time in the Pacific Northwest. Super-power lines may, however, become of importance at an early date to carry power from our abundance to less favored regions to the south and east.



The Long Lake power station of the Washington Water Power Company, located at Long Lake, Washington, is the largest generating station in the district covered by the report. The installed capacity is 70,000 hp. of electrical energy.

APPENDIX

The Super-Power Survey Committee was created in 1921, through various engineering organizations acting in conjunction with Chambers of Commerce in the Northwest. Its personnel includes representative engineers in educational institutions, in private practice, and in municipal and corporation utilities.

The object of the survey is—"to obtain an authoritative and reliable compilation of data to be made available to the public, to capital, to existing and future operating companies, to industries in general and to commercial and legislative bodies; and to further industrial development by an attempt to forecast and indicate such methods of power expansion, development, and interconnection as may ultimately prove sound."

The committee members have served without compensation, and have defrayed all expenses connected with the work except for drafting and printing which was paid by the Portland Chamber of Commerce. The personnel of the committee follows:

SUPER-POWER SURVEY COMMITTEE

D. C. Henny, Consulting Engineer; J. C. Stevens, Consulting Engineer; F. H. Murphy, Portland Railway, Light & Power Co.; W. H. Crawford, Portland Chamber of Commerce; L. T. Merwin, Northwestern Electric Co.; Llewellyn Evans, City of Tacoma; R. M. Boykin, North Coast Power Co.; F. F. Henshaw, U. S. Geological Survey; H. H. Schoolfield, Pacific Power & Light Co.; R. H. Dearborn, Oregon Agricultural College; J. B. Fiske, Washington Water Power Co.; G. L. Parker, U. S. Geological Survey; R. B. Childs, Intermountain Power Co.; E. W. Lazell, Consulting Engineer; C. P. Osborne, Portland Railway, Light & Power Co.; R. K. Tiffany, Consulting Engineer; W. R. Putnam, Idaho Power Co.; E. R. Cunningham, S. P. & S. Ry. Co.; J. P. Growden, City of Seattle; G. E. Quinan, Puget Sound Power & Light Co.; Joseph Jacobs, Consulting Engineer; R. Beeuwkes, C. M. & St. P. Ry.; R. M. Jennings, Douglas County Light & Water Co.; C. E. Magnuson, University of Washington; F. Urban, C. M. & St. P. Ry.; R. U. Steelquist, Mountain States Power Co.; W. M. Shepard, The California Oregon Power Co.; H. V. Carpenter, State College of Washington.

Data on which this report is based were secured through questionnaires sent to each municipal and public utility. The cooperation of these utilities in furnishing information desired has been very commendable and this occasion is taken to extend to them the thanks of the committee.

The field comprised in the study covers the states of Washington, Idaho and Oregon. Power developments in these states naturally divide themselves into five groups, within each of which power plants are interconnected or can be connected at slight expense.

Power Generated

Data have been secured from utilities producing over 90 per cent of the total power generated. Utilities which have sent in complete reports are listed in five major groups as follows:

1. Puget Sound Group: City of Seattle, City of Tacoma, Puget Sound Power & Light Co., and Olympia Light & Power Co.

2. Upper Columbia Group: Washington Water Power Co. and Pacific Power & Light Co. (Yakima-Walla Walla Division).

3. Lower Columbia Group: Portland Railway, Light & Power Co., Northwestern Electric Co., Pacific Power & Light Co. (the Dalles-Hood River and Astoria Divisions), and North Coast Power Co.

4. Snake River Group: Idaho Power Co., Eastern Oregon Light & Power Co., and Cornucopia Mines Co.

5. Southern Oregon Group: The California Oregon Power Co. and Mountain States Power Co.

These data are presented in the form of diagrams as follows:

Figs. 1 to 6, inclusive, give the average load and the maximum load per month (one-hour peak) in kilowatts for each group and for the entire Northwest. The rate of growth in demand for average and maximum loads is also given, as well as the provisions planned for future demands. The terms used on the drawings have the following significance:

"Effective Station Capacity" is the capacity of generation of the installed equipment in kilowatts. It is usually the capacity of the generators for a continuous run of one hour as limited by turbines or boilers, or the generators themselves, but not by water supply.

"Primary Power—Average Year" is the effective station capacity of hydro-plants as limited by water supply during the average water year.

"Primary Power—Low Year" is the effective station capacity of hydro-plants as limited by water supply during a low water year.

The total average rate of generation in 1921 for all groups was 210,000 kw. and the peak load was 392,000 kw., giving an annual load factor of 54 per cent.

Table I shows the average load conditions by groups for the year 1921:

Table I—Average Load Conditions by Groups—1921

| Group | Average Load | Peak Load | Annual Load Factor |
|----------------------|--------------|-------------|--------------------|
| Puget Sound..... | 68,000 kw. | 156,000 kw. | 44% |
| Lower Columbia..... | 50,000 | 92,000 | 54 |
| Southern Oregon..... | 17,000 | 25,000 | 68 |
| Upper Columbia..... | 51,000 | 82,000 | 62 |
| Snake River..... | 24,000 | 37,000 | 65 |
| All Groups..... | 210,000 kw. | 392,000 kw. | 54% |

Table II gives the total power in kilowatt-hours generated in each group during 1921, both by steam and hydro-plants:

Table II—Total Power Generated—1921

| Group | Power Generated—Kilowatt Hours | Steam | Hydro | Total | % of Total |
|----------------------|--------------------------------|---------------|---------------|-------|------------|
| Puget Sound..... | 30,493,000 | 561,534,000 | 592,027,000 | 5.2 | |
| Lower Columbia..... | 73,410,000 | 360,416,000 | 433,826,000 | 16.8 | |
| Southern Oregon..... | 11,350,000 | 152,020,000 | 163,370,000 | 6.9 | |
| Upper Columbia..... | 61,000 | 443,838,000 | 443,899,000 | .015 | |
| Snake River..... | 1,260,000 | 202,018,000 | 203,278,000 | 1.6 | |
| All Groups..... | 116,574,000 | 1,719,826,000 | 1,836,400,000 | 6.3 | |

The total energy generated in 1921 in all groups, as reported, was nearly two billion kilowatt-hours. To produce the amount of energy by coal which is now produced by hydraulic power would require the consumption of about two million tons annually.

Growth of Power Demand

The rate of the growth of power demand for the years 1915 and 1921, inclusive, is shown on the drawings for each group. In all groups there was a general increase in the load during 1919 over previ-

TABLE V—Plants in Operation May 1, 1923

| Number on Map | | | | Installed Generating Capacity (Horsepower) | | Number on Map | | | | Installed Generating Capacity (Horsepower) | |
|-------------------------------|--|---------|--|---|---------|--------------------------------------|--------------------------------------|---------|--------|---|-------|
| Plant and Owner | | | | Hydro | Steam | Plant and Owner | | | | Hydro | Steam |
| PUGET SOUND GROUP | | | | | | SOUTHERN OREGON GROUP | | | | | |
| Puget Sound Power & Light Co. | | | | | | Florence Electric Co. | | | | | |
| 1 | Bellingham | | | | 2,670 | 1 | Florence | | | 130 | |
| 2 | Nooksack | | | 2,000 | | | Yaquina Electric Co. | | | | |
| 3 | Everett | | | | 2,000 | 2 | Newport | | | 130 | |
| 4 | Post Street | | | | 4,670 | 3 | City of Bandon | | 130 | | |
| 5 | Georgetown | | | | 30,670 | | Mountain States Power Co. | | | | |
| 6 | White River | | | 61,330 | | 4 | Marshfield | | | 6,600 | |
| 7 | Snoqualmie | | | 26,700 | | 5 | Albany | | 520 | | |
| 8 | Puyallup | | | 26,700 | | 6 | Springfield | | | 4,000 | |
| | Washington Power, Light & Water Co. | | | | | 7 | Dallas | | | 1,100 | |
| 9 | Anacortes | | | | 930 | 8 | City of Eugene | | 2,400 | | |
| | Northwestern Power & Manufacturing Co. | | | | | | Cottage Grove Electric Co. | | | | |
| 10 | Elwha | | | 16,000 | | 9 | Cottage Grove | | | 480 | |
| | Clear Lake Lumber Co. | | | | | | Lebanon Electric Light & Water Co. | | | | |
| 11 | Clear Lake | | | | 2,300 | 10 | Lebanon | | | 130 | |
| 12 | City of Index | | | | 120 | 11 | City of Jefferson | | 180 | | |
| | Washington Coast Utilities Co. | | | | | | Douglas County Light & Water Co. | | | | |
| 13 | Arlington | | | 270 | | 12 | Winchester | | 1,900 | | |
| 14 | Stanwood | | | | 100 | 13 | City of Ashland | | 400 | | |
| | North Pacific Public Service Co. | | | | | | The California-Oregon Power Co. | | | | |
| 15 | Bremerton | | | | 430 | 14 | Gold Ray | | 2,080 | | |
| | Sultan Electric Co. | | | | | 15 | Prospect | | 7,000 | | |
| 16 | McCoy Creek | | | 150 | | 16 | Klamath Falls | | 1,000 | | |
| | Granite Falls Electric Light Co. | | | | | 17 | Shasta River | | 600 | | |
| 17 | Pilchuck Creek | | | 100 | | 18 | Fall Creek | | 4,300 | | |
| | City of Seattle | | | | | 19 | Copco | | 37,200 | | |
| 18 | Lake Union | | | 2,000 | | | Keno Power Co. | | | | |
| 19 | Lake Union | | | | 46,670 | 20 | Keno | | 580 | | |
| 20 | Cedar Falls | | | 33,300 | | | Total for Southern Oregon Group | 58,290 | | 12,570 | |
| | City of Tacoma | | | | | UPPER COLUMBIA GROUP | | | | | |
| 21 | Nisqually | | | 32,000 | | | Okanogan Valley Power Co. | | | | |
| 22 | Dock Street | | | | 12,000 | 1 | Oroville | | 2,500 | | |
| | Olympia Light & Power Co. | | | | | | Chelan Falls Power Co. | | | | |
| 23 | Olympia | | | 1,600 | | 2 | Chelan | | 960 | | |
| | Shelton Light & Power Co. | | | | | | Great Northern Railway Co. | | | | |
| 24 | Shelton | | | 100 | | 3 | Leavenworth | | 10,000 | | |
| | Total Puget Sound Group | 202,250 | | | 102,560 | | Tumwater Light & Power Co. | | 270 | | |
| LOWER COLUMBIA GROUP | | | | | | | Washington Coast Utilities Co. | | | | |
| | Grays Harbor Railway & Light Co. | | | | | 5 | Wenatchee | | 1,600 | | |
| 1 | Aberdeen | | | | 3,100 | 6 | Wenatchee | | | 2,500 | |
| | Northwest Electric & Waterworks Co. | | | | | 7 | Entiat | | 1,270 | | |
| 2 | Cloquallum Creek | | | 200 | | | Northwestern Improvement Co. | | | | |
| 3 | Silvia Creek | | | 270 | | 8 | Roslyn | | | 2,570 | |
| | Washington Coast Utilities Co. | | | | | 9 | City of Ellensburg | | 1,600 | | |
| 4 | Montesano Hydro | | | 270 | | | Black Rock Irrigation & Power Co. | | | | |
| 5 | Montesano Steam | | | | 670 | | Priest Rapids | | 2,400 | | |
| | Willapa Electric Co. | | | | | 10 | Pacific Power & Light Co. | | | | |
| 6 | Raymond | | | | 1,330 | | Naches Hydro | | 10,000 | | |
| 7 | Smith Creek | | | 150 | | 11 | Naches Steam | | | 2,670 | |
| | Willapa Power Co. | | | | | 12 | Naches Drop | | 1,900 | | |
| 8 | South Bend | | | | 630 | 13 | Naches | | 400 | | |
| | Central Light & Manufacturing Co. | | | | | 14 | Yakima | | | 670 | |
| 9 | Pe Ell | | | 300 | | 15 | Kennewick | | | 100 | |
| | North Shore Light & Power Co. | | | | | 16 | Pomeroy | | | | |
| 10 | Ilwaco | | | | 280 | 17 | Walla Walla River | | 3,700 | | |
| | North Coast Power Co. | | | | | 18 | Walla Walla | | | 1,330 | |
| 11 | Chehalis | | | | 2,000 | | Starbuck Electric Co. | | | | |
| 12 | Kalama | | | 980 | | 19 | Starbuck | | 130 | | |
| | Northern Clarke County Light & Power Co. | | | | | | Washituna Electric Light & Power Co. | | | | |
| 13 | Yacolt | | | 100 | | 20 | Washituna | | 120 | | |
| | Western Light & Power Co. | | | | | 21 | City of Milton | | 440 | | |
| 14 | Washougal | | | 330 | | | Washington-Idaho Light & Power Co. | | | | |
| | Skamania Light & Power Co. | | | | | 22 | Asotin | | 2,450 | | |
| 15 | Stevenson | | | 100 | | | Washington Water Power Co. | | | | |
| | Pacific Power & Light Co. | | | | | 23 | Post Falls | | 15,000 | | |
| 16 | Goldendale | | | 250 | | 24 | Upper Falls | | 15,000 | | |
| 17 | Husum | | | 100 | | 25 | Monroe Street | | 12,000 | | |
| 18 | Astoria | | | | 1,500 | 26 | Long Lake | | 70,000 | | |
| 19 | Young's Bay | | | | 4,000 | 27 | Little Falls | | 28,000 | | |
| 20 | Tucker's Bridge | | | 400 | | | Spokane & Eastern Power & Light Co. | | | | |
| 21 | Powerdale | | | 8,000 | | 28 | Ninemile | | 16,000 | | |
| 22 | White River | | | 3,000 | | | Little Spokane Light & Power Co. | | | | |
| | Northwestern Electric Co. | | | | | 29 | Milan | | 240 | | |
| 23 | Condit | | | 18,000 | | | Stevens County Light & Power Co. | | | | |
| 24 | Pittcock | | | | 5,000 | 30 | Colville | | 1,600 | | |
| 25 | Portland—Lincoln Street | | | | 13,300 | | Kulzer Electric System | | | | |
| | Portland Railway Light & Power Co. | | | | | 31 | Valley | | 110 | | |
| 26 | Oregon City, "B" | | | 9,850 | | | Republic Light & Power Co. | | | | |
| 27 | Cazadero, "C" | | | 19,800 | | 32 | Republic Hydro | | 800 | | |
| 28 | Estacada, "M" | | | 13,300 | | 33 | Republic Steam | | | 100 | |
| 29 | Bull Run, "O" | | | 28,200 | | | Hermiston Light & Power Co. | | | | |
| 30 | East Lincoln St., "L" | | | | 24,800 | 34 | Hermiston | | 200 | | |
| 31 | Front and Nicolai, "E" | | | | 15,400 | | Total for Upper Columbia Group | 198,690 | | 9,940 | |
| 32 | Silverton | | | 350 | | SNAKE RIVER GROUP | | | | | |
| 33 | Salem | | | | 3,300 | | Enterprise Electric Co. | | | | |
| | Coast Power Co. | | | | | 1 | Wallowa Lake | | 1,150 | | |
| 34 | Tillamook | | | 750 | | | Eastern Oregon Light & Power Co. | | | | |
| 35 | City of McMinnville | | | 600 | 500 | 2 | Cove | | 400 | | |
| | Oregon Iron & Steel Co. | | | | | 3 | Morgan Lake | | 500 | | |
| 36 | Oswego Lake | | | 700 | | 4 | Rock Creek | | 1,060 | | |
| 37 | City of Forest Grove | | | | 130 | 5 | Freemont | | 1,460 | | |
| | Sheridan Light & Power Co. | | | | | 6 | South Baker | | | 500 | |
| 38 | Sheridan | | | | 300 | 7 | City of Baker | | 130 | | |
| | St. Helens Light & Power Co. | | | | | | Cornucopia Mines Co. | | | | |
| 39 | St. Helens | | | | 270 | 8 | "A" and "B" | | 1,000 | | |
| | Tualatin Valley Electric Co. | | | | | | Idaho Power Co. | | | | |
| 40 | Sherwood | | | | 120 | 9 | Oxbow | | 2,500 | | |
| | Stayton Light & Power Co. | | | | | 10 | Horseshoe Bend | | 2,000 | | |
| 41 | Stayton | | | | 120 | 11 | Barber | | 1,200 | | |
| | Molalla Electric Co. | | | | | 12 | Swan Falls | | 15,000 | | |
| 42 | Canby | | | 270 | | 13 | Malad River | | 7,300 | | |
| | Bend Water, Light & Power Co. | | | | | 14 | Lower Salmon | | 10,000 | | |
| 43 | Bend Hydro | | | 1,440 | | 15 | Thousand Springs | | 13,000 | | |
| 44 | North Canal Dam | | | 600 | | 16 | Shoshone Falls | | 16,500 | | |
| 45 | Bend Steam | | | | 1,300 | 17 | American Falls | | 6,700 | | |
| | Deschutes Power Co. | | | | | | Sumpter Power & Light Co. | | | | |
| 46 | Cove | | | 730 | | 18 | Sumpter | | | 200 | |
| 47 | Cline Falls | | | 450 | | | Total for Snake River Group | 79,900 | | 700 | |
| | Heppner Light & Water Co. | | | | | GRAND TOTAL | | | | | |
| 48 | Heppner | | | 200 | | 648,730 | | | | | |
| | Prairie Power Co. | | | | | 208,270 | | | | | |
| 49 | Prairie City | | | 660 | | TOTAL INSTALLED GENERATING CAPACITY, | | | | | |
| 50 | City of Arlington | | | | 200 | STEAM AND HYDRO. | | | | | |
| | Total for Lower Columbia Group | 109,600 | | | 81,500 | 857,000 h.p. | | | | | |

ous years, followed by slight drops in 1920. Evidences of a general recovery in 1921 are also apparent.

Table III summarizes the rate of growth in power demand:

| Table III—Summary of Rate of Growth in Power Demand | | | |
|---|-----------|-------------------|------------|
| Group | Period | Increase per Year | |
| | | Average Load | Peak Load |
| Puget Sound..... | 1915-1921 | 5,700 kw. | 12,400 kw. |
| Lower Columbia..... | 1915-1921 | 4,000 | 5,700 |
| Southern Oregon..... | 1915-1918 | 400 | 400 |
| Upper Columbia..... | 1919-1921 | 2,200 | 2,200 |
| Upper Columbia..... | 1915-1918 | 1,500 | 2,500 |
| Snake River..... | 1919-1921 | 5,000 | 5,000 |
| Snake River..... | 1915-1921 | 2,500 | 2,800 |
| All Groups..... | 1915-1921 | 18,000 kw. | 28,000 kw. |

The average load for the Northwest has nearly doubled in the past 5 years. The increase during the past 7 years was 122 per cent.

Provision for Future Growth

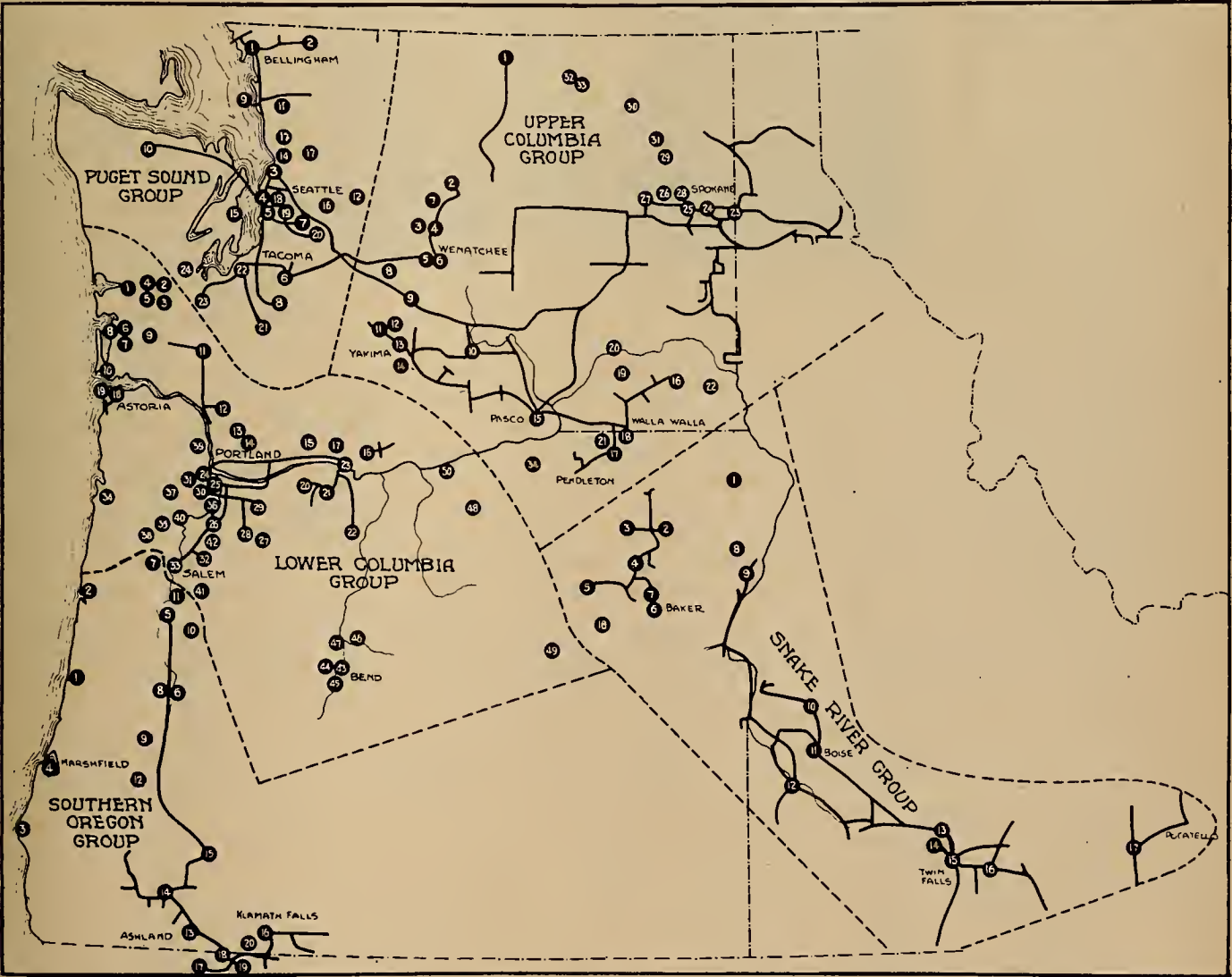
The drawings give the present effective station capacity for hydro-plants and for hydro and steam, and the increases that are planned to take care of the growing demand. The following table summarizes these data for all groups as of 1922:

| | | |
|---|-----------------------|-------------|
| Present effective station capacity | —hydro | 377,000 kw. |
| Present effective station capacity | —hydro and steam..... | 492,000 " |
| Present primary power—average year—hydro | | 232,000 " |
| Present primary power—low year —hydro | | 194,000 " |
| Present primary power—average year—hydro and steam..... | | 347,000 " |
| Present primary power—low year —hydro and steam..... | | 309,000 " |

The probable effective station capacity on basis of present development plans is shown in Table IV:

| Table IV—Probable Effective Station Capacity | | | | | | |
|--|-----------|---|------|------|------|------|
| Group | Peak Load | Probable Future Effective Station Hydro and Steam Capacity in Thousands of Kilowatts at end of Year | | | | |
| | | 1921 | 1923 | 1924 | 1925 | 1926 |
| | | 1927 | | | | |
| Puget Sound..... | 156 | 192 | 248 | 248 | 332 | 332 |
| Lower Columbia..... | 92 | 115 | 154 | 154 | 179 | 204 |
| Southern Oregon..... | 25 | 33 | 33 | 43 | 45 | 45 |
| Upper Columbia..... | 82 | 135 | 143 | 143 | 156 | 156 |
| Snake River..... | 37 | 54 | 54 | 63 | 63 | 74 |
| All Groups..... | 392 | 529 | 632 | 651 | 775 | 811 |

Accompanying this report is a map of the Pacific Northwest showing the location of the more important commercial power plants and the general system of connecting transmission lines as they existed on May 1, 1923. The numbers refer to plants as listed in Table V.



Map of the Pacific Northwest, showing the location of the more important commercial power plants and the general system of connecting transmission lines as they existed on May 1, 1923. The plants numbered on the map correspond with the table on the opposite page.

Operating Costs of an Electrical Home

IS AN electrical home an expensive luxury? In its advertising, in its literature and in its sales arguments, the electrical industry assures the public that such is not the case, but the majority of these statements have lacked weight because they have not been based upon actual cost data under home conditions. A quarter of a million people in California have inspected electrically equipped homes. They have been told of the multiple conveniences, of electrical appliances and have accepted the iron, vacuum cleaner, washing machine, percolator and other devices as necessities in the equipment of a modern home. They are ready to believe that electricity is more desirable than other fuels for cooking and heating on account of its cleanliness, dependability, ease of adjustment and efficiency, but they have not been converted to a complete electrification of the home on account of the fearful bugaboo—cost of operation.

The writer, who owns a completely electrified five-room bungalow at 6 Allston Way, west of Twin Peaks in San Francisco, has kept a careful record of costs over a 3-year period and finds electricity to be economical. Current has been supplied for the past three years at the prevailing rates. In the accompanying table the cost per month was taken from the monthly statements of the power company. During the three years, the house has not been closed for more than three consecutive days. The meals prepared have averaged sixteen per week. Prior to December, 1921, heating was done with wood and coal (oak wood \$20 per cord, soft coal \$20 per ton) in a fireplace, together with two 600-watt Cozyglow portable heaters. Subsequently 7 kw. in air heaters were installed and the fireplace closed.

The prevailing rates for operating an 8-kw. electric range, air heaters, lights and a full and complete line of appliances have been 8 cents per kilo-

By H. L. Garbutt

Merchandising Manager, Westinghouse Electric & Manufacturing Co., San Francisco

C*OST of operation is the specter which stands in the way of the electrification of many homes. In this completely electrified home the cost of current for lights, cooking, hot water, heat and a full line of electric appliances averages \$13.88 per month over a three-year period.*

watt-hour for the first 30 kw-hr., 3½ cents per kilowatt-hour for the next 130 kw-hr., and 2 cents per kilowatt-hour for all over 160 kw-hr. The rates for operating the 1,500-watt thermostatically controlled water heater were \$2.50 per month plus 3 mills per kilowatt-hour.

On the basis of these rates, it is seen from the table that the costs for the

various phases of electrical service in this five-room house for a family of three were:

| | |
|---|--------|
| Average cost per month for water heating | \$4.11 |
| Average cost for cooking, lighting and operating two 600-watt air heaters and a complete line of appliances | 6.15 |
| Average cost per month to operate 7 kw. in air heaters | 3.62 |
| Average cost per month for cooking, heating, lighting, washing, ironing and machine sewing | 13.88 |

From this dollars and cents cost can be deducted the saving in time and labor, the cost of repainting the kitchen every year, and the multiplicity of conveniences which electricity brings about. The bother of carrying wood and coal, tending a furnace, disposing of ashes or cleaning a gas range are entirely eliminated in an electrically equipped home. The saving in food values is an item to which no dollars and cents value can be readily assigned. The additional time which a housewife has placed at her disposal when a home is equipped with an electric range is a saving which does not appear in the above figures. Innumerable other arguments can be offered in further support of the contention that electricity is highly economical. With actual cost figures such as those above, a belief in the various appliances based on actual experience, and the strong sales argument which the electrical idea lends itself to, men of the electrical industry will find the task of electrifying every modern home less difficult.

COST OF OPERATING AN ELECTRIC HOME OVER A THREE YEAR PERIOD*

| Month | 1920-21 | | | 1921-22 | | | 1922-23 | | |
|-----------|--|-----------------|--|--|--|-----------------|--|-----------------|--|
| | Range, 2—600 watt Air Heaters, Lights and Appliances | Water Heater | | Range, 2—600 watt Air Heaters, Lights and Appliances | Range, 8,200 watts in Air Heaters, Lights and Appliances | Water Heater | Range, 8,200 watts in Air Heaters, Lights and Appliances | Water Heater | |
| March | \$5.37 | \$3.85 | | \$6.21 | | \$4.36 | \$ 9.64 | \$4.45 | |
| April | 4.71 | 3.70 | | 5.37 | | 4.25 | 9.15 | 4.26 | |
| May | 4.21 | 3.79 | | 5.71 | | 4.03 | 7.66 | 4.20 | |
| June | 4.05 | 3.75 | | 7.89 | | 4.10 | 8.58 | 4.25 | |
| July | 7.38 | 4.56 | | 7.95 | | 3.49 | 7.43 | 4.16 | |
| August | 6.37 | 4.80 | | 4.40 | | 3.96 | 6.03 | 4.14 | |
| September | 6.08 | 4.07 | | 5.30 | | 3.90 | 6.85 | 3.87 | |
| October | 7.18 | 4.55 | | 6.11 | | 3.17 | 8.28 | 3.76 | |
| November | 7.46 | 4.32 | | 6.29 | | 4.12 | 12.58 | 4.05 | |
| December | 8.20 | 4.61 | | † | \$10.97 | 4.03 | 14.98 | 4.04 | |
| January | 7.55 | 4.29 | | † | 13.96 | 4.25 | 15.57 | 4.19 | |
| February | 5.75 | 4.23 | | † | 14.49 | 4.19 | 10.45 | 4.28 | |
| Average | \$6.18 | \$4.21 | | \$6.13 | \$13.14 | \$3.99 | \$9.77 | \$4.14 | |

*These figures include a surcharge of 6 per cent.

†Seven additional kilowatts in air heaters were installed December, 1921.

A Service for the Electrical Contractor

An Announcement

ONE of the notable weaknesses of the electrical construction industry in the West is that there is no clearing house in existence whereby a contractor can learn from the printed word what his fellow craftsman is doing. Each individual has been largely limited to his own circle of personal acquaintances in the discussion of the best and latest methods of electrical construction and the constant changes in practice in this growing industry. Other branches of the electrical industry have long profited by the publication of ideas, whereby the best thought of groups is brought together in a discussion of common problems.

Recognizing the need for a common forum for the interchange of ideas in the electrical contracting field, the Journal of Electricity and Western Industry is publishing a series of articles by a recognized authority on electrical construction, the first of which appears in this issue.

Mr. E. Earl Browne, president of the California State Association of Electrical Contractors and Dealers, needs no introduction to members of the contracting industry in the West. Mr. Browne has been identified with the electrical construction industry for the past fifteen years. He has been active in educational and organization work, and is a member of the successful firm of Browne-Langlais Electrical Construction Company, of San Francisco, being widely recognized as one of the most progressive and well informed men of the industry.

It is the object of this series of articles to discuss in a practical manner the many problems which daily confront the man engaged in electrical construction. The articles will be non-academic. Every attempt will be made to present the facts in a practical and readily understandable form. To this end, wherever possible, drawings, sketches and pictures will be liberally used to supplement the text. Mr. Browne will discuss the current practice of electrical



E. EARL BROWNE

President of the California State Association of Electrical Contractors and Dealers and author of the series of articles on Electrical Construction beginning on the following pages.

installation in compliance with the latest code provisions for all classes of electrical construction. This will include the wiring of residences, flats, apartments, garages, machine shops, industrial plants, oil stations and the like. Other articles in preparation will discuss such subjects as grounding, motor control, flexibility of installation to care for changes and additions, estimating and job organization.

The cooperation of the electrical contracting fraternity among our readers is invited. It is the earnest desire of both Mr. Browne and the Editors to make this series of practical, dollars-and-cents value to the electrical contractor. In order that this may best be accomplished, criticisms and suggestions will be welcomed.

The intelligent contractor realizes that he is best serving himself by doing quality work—

for which he should receive a fair profit. No man will knowingly commit business practices which result in actual loss to him. Ignorance of the best methods is a poor excuse, yet to ignorance alone may be attributed many of the losses which occur daily in the contracting field. An opportunity to keep abreast of the times is now offered through the medium of the printed word.

It is the expectation of the author that the series of articles on electrical construction will furnish a ready reference book for the intelligent contractor that he may employ the most economical and best accepted methods. The series should, by offering working drawings and practical discussions, be of great interest to journeymen, thus reducing to a minimum the amount of supervision required from the employing contractor. It is hoped that by presenting the actual details of construction work, as well as hints as to how business may be better conducted, the contractor will be able to show the legitimate profit on his books to which quality work is entitled.

ELECTRICAL CONSTRUCTION



By E. Earl Browne

RESIDENCE construction forms almost sixty per cent of the building activity of the country today, and upon the proper wiring of the residence depends the prosperity of the electrical industry of the future. The residence installation is the simplest of any electrical installation and for that reason this class of work is subject to keen competition. The results of this competition are too familiar to warrant much discussion. It is sufficient to say that the average residence installation is not indicative of progress nor does it reflect credit upon the electrical industry. In many instances the more intelligent contractors have abandoned the residence wiring field to curbstoners. As a result, the householder does not receive the full measure of convenience in his electrical installation which he desires, but which he, being unfamiliar with the progress of the art, is unable to anticipate.

It is the object of this and succeeding articles to discuss phases of the electrical installation in the better equipped home—the home so equipped that

the householder gets full value for the money spent upon his electrical work.

Installing the Service and Distribution Board

The first portion of the work to be considered by the contractor is the service and distribution board. It is important that this be located in a readily accessible place so that meter reading and testing will not disturb the occupants of the house. The service and distribution board should be so constructed that future additions to the load may be installed without entirely tearing down the work already done.

The service wires should be No. 2 B. & S. R. C. (assuming a 3-wire, single-phase, 220-110-volt distribution) for a house of six rooms or less, in order to provide for the following loads:

| | |
|--|---------|
| Range and water heater with double throw switch | 8.0 kw. |
| Air heaters (7 off)..... | 17.0 " |
| Ceiling, bracket and convenience outlets, etc..... | 3.0 " |

Total..... 28 kw.

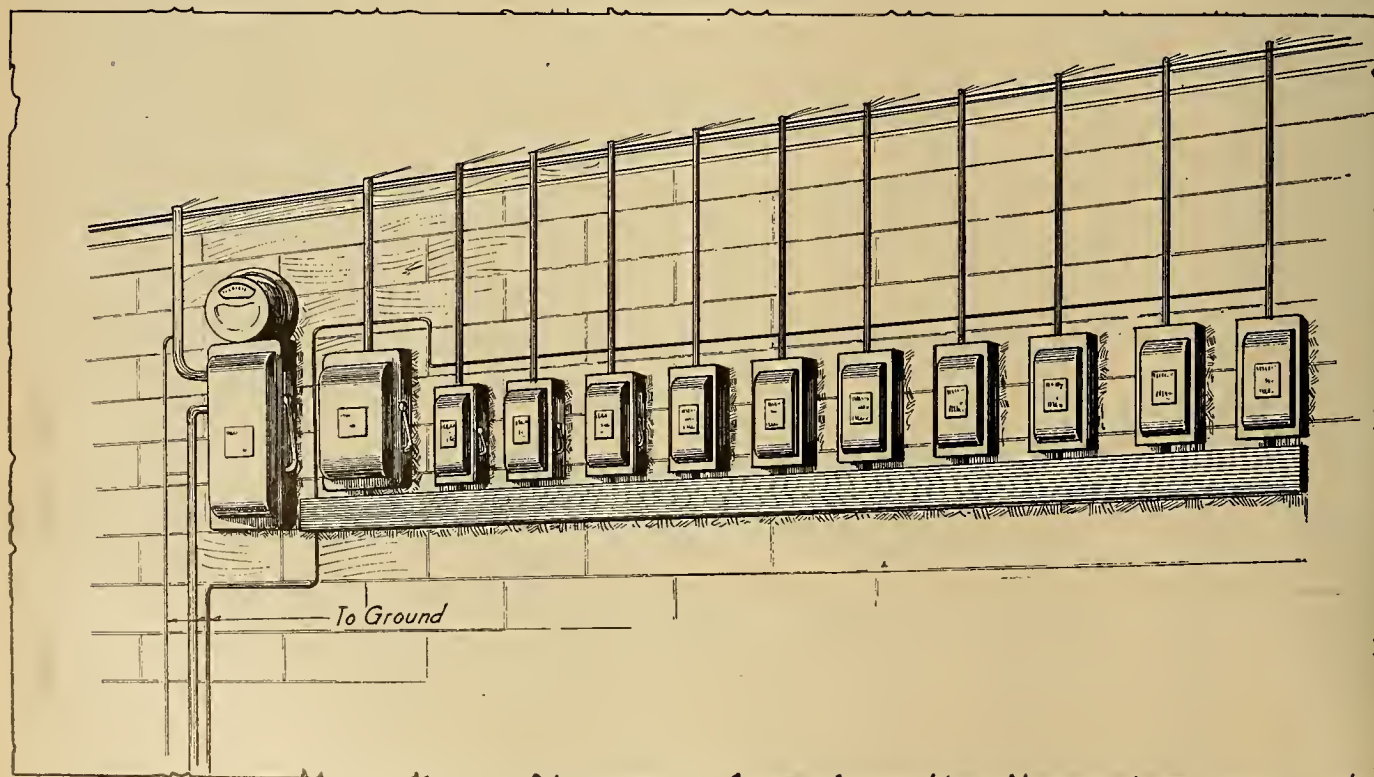


Fig. 2—Sketch of an all conduit service and distribution board installation for a residence equipped with electric range and water and air heaters.

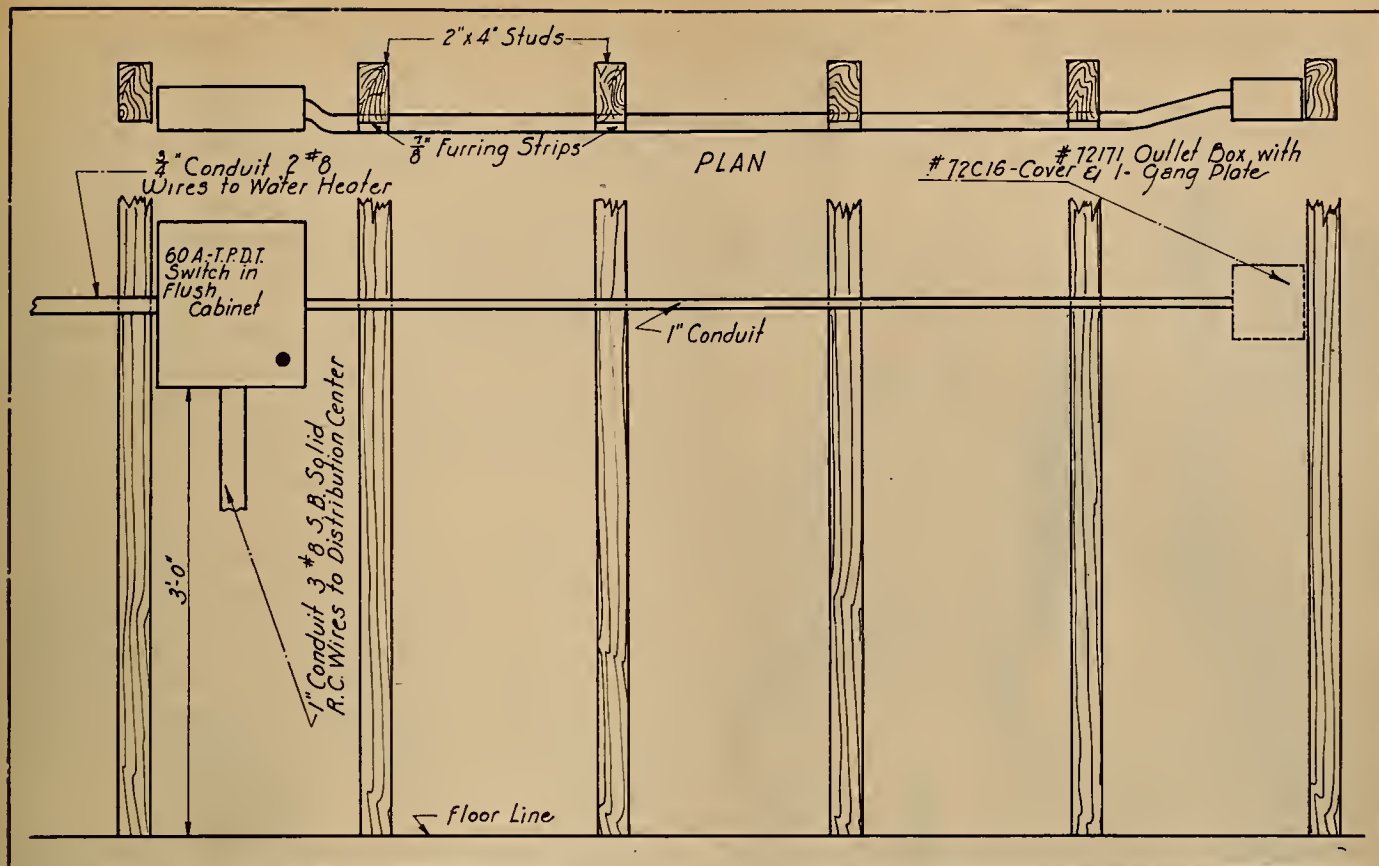


Fig. 3—Construction detail of range and water heater flush switch with junction box.

It is essential that ample service wire capacity be provided even though the initial installation may only include lighting and convenience outlets. With a diversity factor of 70 per cent the above load would make a total of 90 amp. and since No. 2 wire is rated in Table A of the National Electric Code at 90 amp., it would come within the provisions of the code. (The diversity factor of any system, or part of a system, is the ratio of the sum of the maximum power demands of the subdivisions of the system, or part of a system, to the maximum demands of the whole system, or part of the system under consideration, measured at the point of supply.)

The service switch should be 100 amp., 250 volts with solid neutral. The present practice of most

power companies is to measure all current through one meter, and to have a sliding scale of rates and a monthly minimum ready-to-serve charge per kilowatt of connected load.

The ideal service, meter and distribution board would therefore be of about the dimensions and arrangement as Fig. 1.

Note in the accompanying diagrams (Figs. 1 and 2) that the busbar trough is set below the circuit switches. This arrangement enables the owner to change a switch at any time or make repairs without disturbing the entire installation which would be necessary were the switches connected with conduit nipples and splices made in each individual switch.

Figs. 1 and 2 show an ideal all-conduit installa-

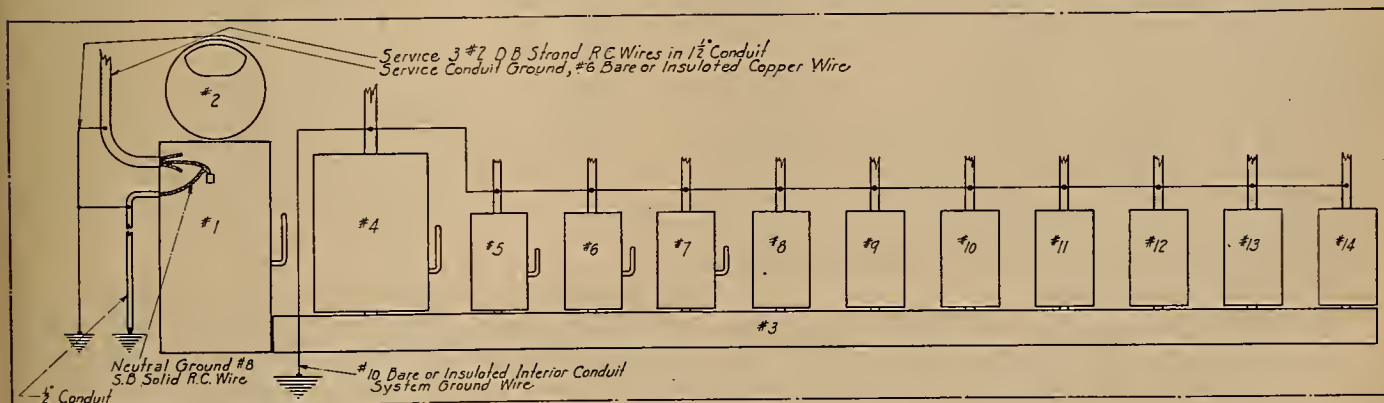


Fig. 1—Construction arrangement of service and meter and distribution center. No. 1—Main service switch. No. 2—Power company's meter. No. 3—Metal busbar trough. No. 4—60-amp., 3-pole range and water heater circuit switch. Nos. 5 to 11, inc.—30-amp., 2-pole air heater circuit switch. No. 12—30-amp., 2-pole convenience outlet circuit switch. Nos. 13 and 14—30-amp., 2-pole lighting circuit switch.

tion with provision for complete electrification of the home. Note the modern type of service switch with meter attached. This type which has been standard-

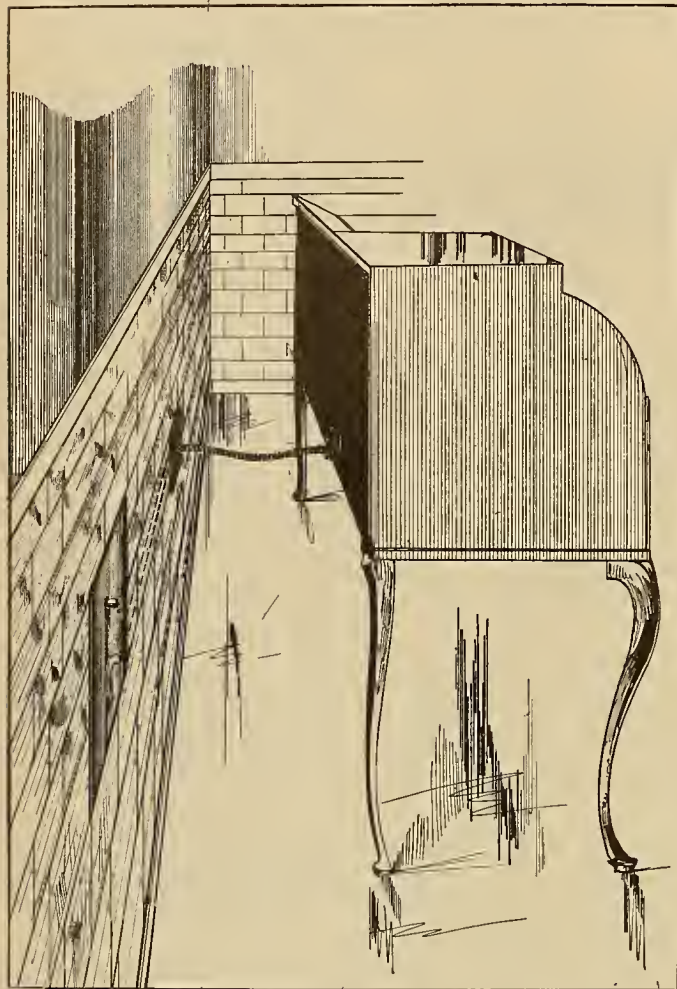


Fig. 4—Sketch showing arrangement of flush type double-throw range and water heater switch with range connected at junction box.

ized by several manufacturers has many features which make it the most desirable.

The Range Installation

The well equipped home will contain an electric range and water heater. The range and water heater should be placed on a double throw switch located near the range (Figs. 3 and 4), one side of which is usually fused for the water heater and the other is unfused for the range, as the size of wire is not reduced for the range, whereas the water heater, usually being of 5-kw., 220-volt capacity, requires but two No. 8 wires. It is desirable in a range installation to use a flush type of double throw switch. Manufacturers are now developing their lines to include the type of switch shown in Fig. 4, which should be 60-amp. capacity.

In installing a range in an old building the position of the range is usually predetermined and the installation can be made with a minimum of exposed flexible conduit direct from switch to range. In new

buildings where the kitchen wall is of white tile and the range white enameled, it is extremely desirable to make a neat installation, but this is difficult because the exact position of the range and the type of oven is not usually known. In order to eliminate as much flexible conduit as possible, the scheme in Fig. 3 was devised. This consists of a flush outlet box located from six to ten feet from the switch and connected by concealed conduit. After the exact position of the range is determined, and the type of oven selected (right-hand or left-hand), the flexible conduit can be connected from either the switch or the junction box to the terminal box of the range, depending upon which is the closer. The covers of both switch and junction box have a readily removable knockout so that it makes a universal installation.

Flush Type Air Heater Installations

Many modern homes are now being equipped with electric air heaters. In case the combination convection and radiation type of heater is used, these heaters should be placed if possible on the exposed or outside wall. The bottom of the heater should be near the floor, to facilitate the circulation of air, preferably not over three inches above the finished floor line.

The method of installing a flush type heater is shown in Fig. 5. Note the two-pole, three-heat flush switch in standard, two-gang deep switch box which

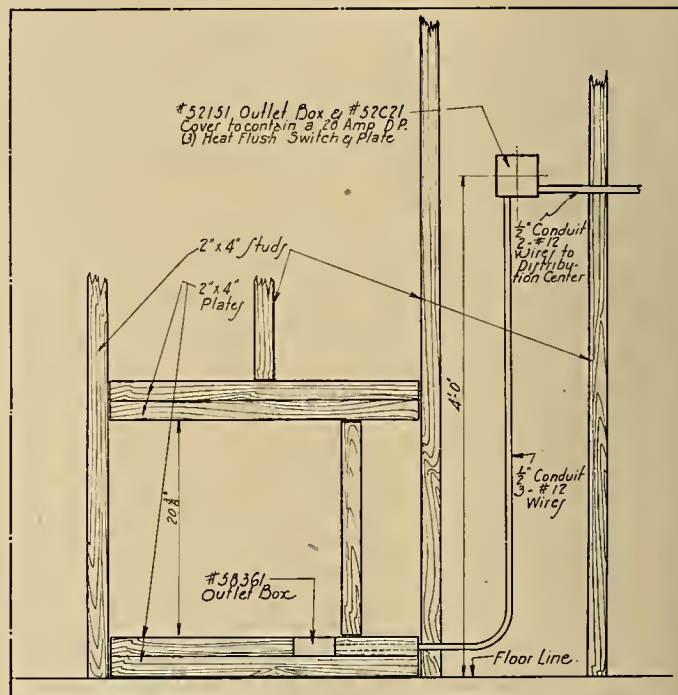


Fig. 5—Construction detail for flush type air heater and control switch.

is located at the convenient height of four feet from the floor. The heater circuit from the distribution center is run to the switch, and three wires are installed from the switch to the junction box located below the right-hand front corner of the heater.

JOBBER, DEALER AND SALES AGENT



Plans Perfected for "June Bride Week" Campaign

California Electrical Cooperative Campaign Will Aid in Directing June Buying Toward Electrical Merchandise

A concentrated effort to materially increase the sale of electrical household appliances by encouraging their use as wedding gifts will be undertaken by the California Electrical Cooperative Campaign during the week of June 4-9, 1923. Basing its efforts on the experience of last year when a similar campaign was staged with considerable

including all retail agencies engaged in the distribution of electrical appliances, will cooperate in directing toward electrical merchandise the enormous purchasing power incident to June marriages.

The attention of the public will be directed toward electrical goods by means of window displays, newspaper advertising and publicity, slides in the theaters and radio broadcasted addresses. Material is being prepared for free distribution to all electrical retailers. This will include posters, slogans, theater slides and cuts for use in preparing newspaper advertising copy.

The poster will be the same as was used last year. It consists of a picture of a June bride printed in three colors on a sheet 16 by 23 in. A black and white reproduction of the poster, similar to the cut which will be used in all newspaper advertising copy, accompanies this article. The slogans, which will be printed in black and orange on a sheet 4 1/4 by 14 in., will bear such messages as "Combine Beauty and Comfort," "For Her Convenience," "For Modern Homes," "For Her Future Happiness," and "Gifts that Endure." The slide to be used in the theaters will be a reproduction of the poster in colors.

As an incentive to dealers to use the window display material in decorating their windows, prizes to the extent of \$100 have been offered by the California Electrical Cooperative Campaign for the best window. The awards will consist of \$25 for the best window, five prizes of \$10 each for the next best windows and five prizes of \$5 each for the next five. Photographs of all prize winning windows will be reproduced in the Journal of Electricity and Western Industry.

All orders for material must be in the hands of the Cooperative Campaign not later than May 7 so as to assure its prompt receipt by the retailer.

As an initial step in the June Bride Week campaign the following letter has been sent to the advertising managers of 97 California newspapers:

"You will be interested to know that a statewide sales campaign is to be inaugurated by the entire electrical industry during the week of June 4-9.

"To increase the sales-producing effect of the window display material which we are furnishing we are urging all local retailers of electrical appliances, and the power companies, to carry newspaper advertising; and as further encouragement toward this end we are offering to supply them free mat or stereo copies of the window-poster, in the form of a one-column, three-inch, black and white reproduction. This we are suggesting they embody in display ads as a means of tie-in between their newspaper copy and their window-trims.

"In addition to the power companies, everyone in your community who retails electrical appliances is included in this offer, and should be a good prospect for space in your columns, whether they be hardware merchants, druggists, furniture dealers, or strictly electrical retailers. We want to work with you in stimulating their appreciation of the benefits to be derived from a well-planned campaign of newspaper advertising. If you think of any further way in which we can be of assistance we would be pleased to have you suggest it.

"In a short time we will mail to you a series of articles which we hope you will be able to use, together with the advertising you procure, in the preparation of a special 'electrical section,' sometime during the 'June Bride' campaign."

Manufacturers and jobbers will cooperate in the campaign through their



Reproduction of the poster which will be distributed to all retailers.

success, plans have been outlined which are expected to benefit all branches of the electrical industry in the state. It is hoped that electrical merchandise to the value of approximately one million dollars will be moved from the dealers' shelves during the week of intensified sales activity.

Records for the state of California show that during 1922 there were 47,477 weddings, approximately one-sixth of which occurred during June. Under ordinary conditions there is a slowing up in the sale of electrical appliances during this month, which is popularly known in all lines of retail trade as "the summer slump." By means of the June Bride Week campaign the electrical industry expects to create a volume of business equal to that of the Christmas holidays.

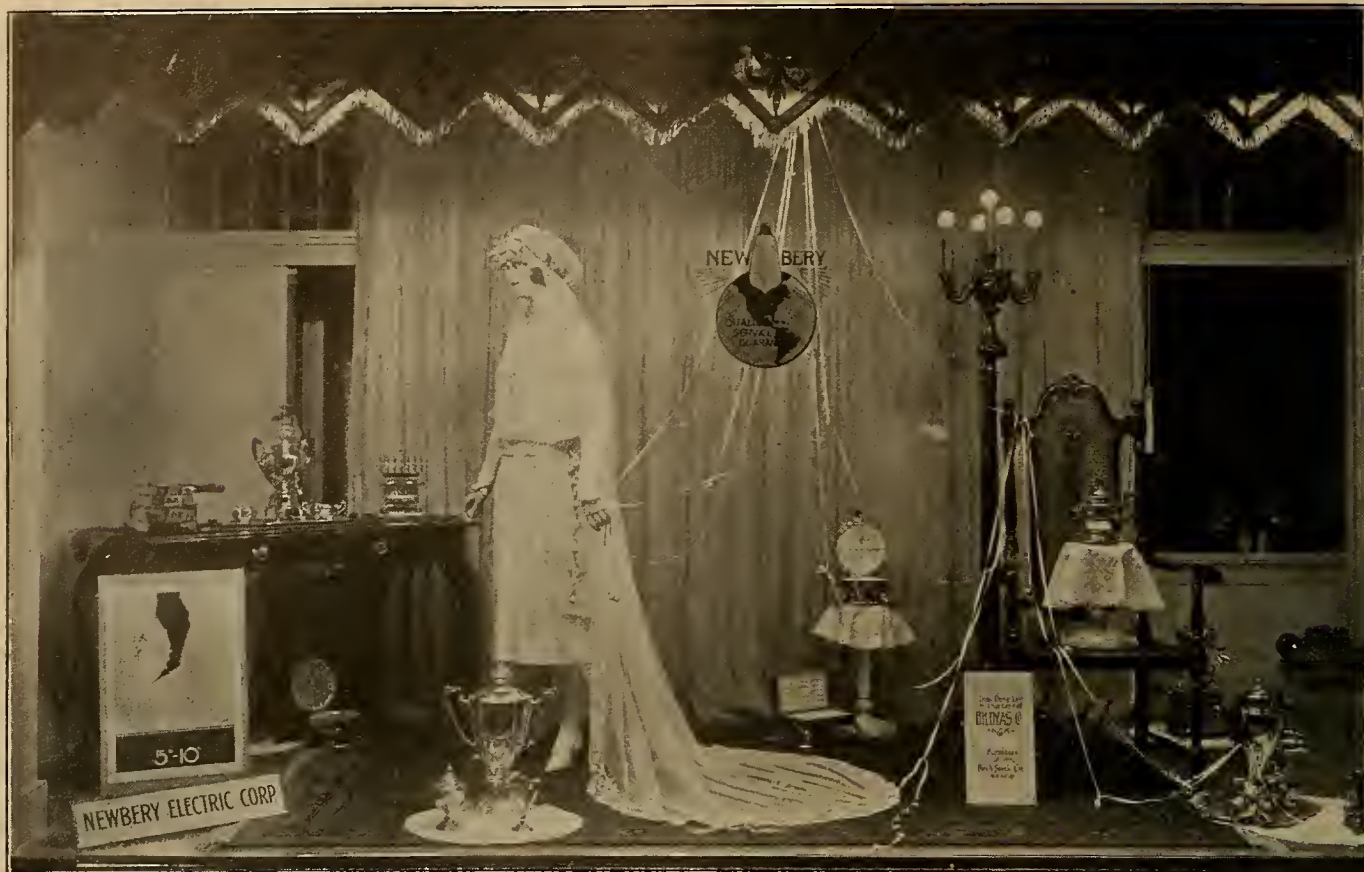
During the week of June 4-9, every department of the electrical industry,

What is the "June Bride" Campaign?

It is a concentrated effort by the entire electrical industry of California to materially increase the sale of electrical household appliances and devices by encouraging the practice of giving electrical wedding gifts.

DO YOU REALIZE THAT THERE WERE 47,477 WEDDINGS IN CALIFORNIA IN 1922?

This sticker explaining the campaign is being attached to all mail which goes to the industry.



Window display of the Newbery Electric Corporation of Los Angeles used during June Bride Week last year.

salesmen who will be used in spreading the message among the various dealers and retailers. The following letter has been sent to the sales managers of 66 manufacturers and jobbers in the state:

"We are determined that the 'June Bride' sales campaign shall go over bigger and better and be more far-reaching this year than last. But our determination will be like a gust of wind unless everyone in the electrical industry gets behind it and puts it over.

"You have seen a kid playing with a hoop—if he gives it a push it starts out with flying colors, soon it starts to waver, then to stagger about in circles and finally it dies in agonized convulsions. But if the kid keeps batting it along it maintains its even course and finally reaches the goal toward which it is directed.

"The same thing is absolutely true of a sales campaign. If it is to be left to pursue its own unguided way it had best never be launched. But if it is boosted, batted and urged along by everyone who is interested in its 'arriving,' then it is sure to steadily gain momentum and accomplish its purposes.

"We want this sales drive to go over in a big way. We are going to launch it and we are going to urge it along wherever it lies in our power to do so; but there are long gaps where we can't keep our hand on it and we want you and your organization to keep the 'hoop' on its way.

"June 4-9 has been selected for the period of concentrated effort. It is during this period that the special advertising features are planned for. All window display material will, however, be in the hands of the dealers by May 28, giving them a full week in which to

get their windows and stores attractively arranged.

"There will be eleven prizes, aggregating \$100, distributed among the retailers for the best trimmed windows.

"In about two weeks you will receive a copy of a circular letter which will give you in detail all of the plans for this sales drive, and from that you will undoubtedly learn of many ways in which you can tie in. In the meantime, HERE IS WHAT WE WISH YOU WOULD DO—First: Inform all of your sales staff of this drive, impress upon them the mighty important part that they as individuals play in its success or failure, and urge them to carry the message of the week and its possibilities to every dealer upon whom they call, stimulating him toward contesting for a prize. Second: Have your salesmen take the dealers' orders for the window display material, which will be composed of a 3-color poster and a set of sales-stimulating slogans. These orders are then to be mailed to us, no order being honored after May 7, and the material will be shipped free to the dealers. Third: Send us, at your earliest possible convenience, a list of your salesmen and the addresses to which we shall mail them copies of the folder describing the drive in detail. These will go forward immediately they are off the press.

"We must count on you for this information and assistance. Remember, every disinterested delay slows up the whole program."

The central stations of the state will tie in with the June Bride Week idea through their advertising. Stickers similar to that illustrated have been distributed for use on letters.

Suggestions for window displays by dealers can be taken from the accompanying photographs which show some of the windows employed last year for carrying the message of June Bride Week to the public.

Drink with Familiar Friends— Compare Bids with No One

By JOE OSIER

"Drink only with familiar friends and recite poetry only with a poet" reads an old proverb and—

Because the thing I am pleased to call my mind goes along with the mind of the man who coined the quoted phrase—

I shall warm up an idea I have on tap and send it out to battle in this column for a few fast rounds; to combat until given the gate or until I wind up the blurb amid a fanfare of trumpets and a tumpping of tom toms.

Here 'tis: Drink only with familiar friends and show your bid to no one—(with the possible exception of your partner)—

Lest you be gyped, flim-flammed and fozzled.

Some men of the Electrical Industry may take exception to my views on this subject, but that is their privilege. I must have views—or get back on the milk wagon—therefore,

I am of the opinion that a Man of the Trade who deliberately clammers to the housetops, waves his estimates on high and welcomes the world to lamp his bids is—

Inviting the "second low" and "too high" boys to collect his scalp; begging

them to snatch the lunch from his lips and—

Insisting that they grease the skids that lead downward and out.

Now I know of men in the game who are afraid to turn in a bid until they have questioned every other prospective bidder in the business. They want to compare estimates to see how they stand. They want to make absolutely sure that they are not too high nor too low and—

While they are finding out, they are tipping their mitts until a blind man could read their figures through—

Seven feet of sheet steel without goggles.

And, what does it get 'em?

And I answer: Nothing—including the loss of the job, because—

"Tigers and deer do not stroll together" 'and, by that I do not mean that Men of the Trade are either tigers or deer. As a rule, they are plain business men—seeing their duty and doing it—taking their discount when they can—redeeming their paper at the bank and—

Conducting their affairs in a business-like way and—

Business-like ways do not provide for showdowns until the estimates are tabulated and the results announced.

Sure, I realize that kind friends are better than unkind brothers, still—

I have known kind friends to wave a wicked weapon when a particular job was in danger of being lost.

Friendship, you know, does not necessarily call for coming clean when a plum is waiting to be plucked and a real friend will not jeopardize friendship by insisting upon a comparison of bids unless—

He is looking after the interests of some deaf, dumb and blind friend who, foolishly, is trying to make a name and a roll in a game that is meant for men only.

Now, I may be wrong. Still, in spite of the fact that I have been proven in error innumerable times, I have never admitted it and—

In this case, also, I am hanging "tuff" waiting for some one to show me that comparing bids gets any place except—

The short end of a long horn.

Now the opposition can have the floor. Spring to't.

a souvenir of the occasion and presented illustrations of installations in various domestic science departments in California. Mr. Van Kuran urged the Board of Education to give serious consideration to specifications and proper installation of the wiring needed to meet the present and future demands of the department. He explained that when buildings are being erected is the proper time to make this installation rather than after they are completed.

E. F. Scattergood, chief electrical engineer of the Bureau of Power and Light, City of Los Angeles, expressed a willingness upon the part of the bureau to cooperate in every way with the school board and render every possible assistance in meeting their requirements. Robert L. Eltringham, manager of the California Electrical Co-operative Campaign, addressed the assembly on the subject "The Electrical Home of Today and Tomorrow," and urged the board to give serious consideration to the statements as outlined by Mr. Van Kuran, with reference to the installation of an adequate wiring system.

He explained that the servant in the home of today is a thing of the past and that the future requirements of the housewife will be such that it will be absolutely necessary, in order to lessen the burden of housekeeping, that the proper wiring installation be incorporated at the time of building. He stated that it was to the best interest of the housewife to have a number of convenience outlets installed in every room in order that she might be able to conveniently connect and use the many electrical devices designed to lessen her work.

In Mr. Van Kuran's opinion, the expression, "the woman's field is broadening," is heard everywhere today. He said that this is true in individual cases only in proportion to the degree in which the individual woman employs scientific time and labor-saving devices in the performance of her household tasks, thus conserving her time and strength for outside activities.

There is exactly the same routine of household duty in a home today as there was in those days when a woman was kept busy from sun-up until late in the night. The method of performing those duties is the only thing that has changed. Housekeeping today is what the woman makes it; it may be a pleasure or it may be a drudgery.

In planning to save her strength and her health, in planning to save time, whereby she might seek the pleasures which she most enjoys, the first place to receive a woman's attention should be her workshop. The woman's workshop is the kitchen for it is there that the greatest amount of time and energy is expended. Cooking in a kitchen which is dark and gloomy, faced by an array of pots and pans, with everything looking and feeling steamed and greasy, a woman loses more vitality than in any of her other household tasks. Anything that can be taught her to relieve this condition is a step in advancement.

Milton Henock, electrical range specialist of the Westinghouse Electric & Manufacturing Company, Miss B. E. Galvin, in charge of the home Economics Department of the Edison Electric Appliance Company, and R. E. Wyman, chief on the staff of the Los Angeles

Use of Electricity Taught in California Schools

Industry in Los Angeles Tenders Electrically Cooked Banquet to 300 High School Domestic Science Teachers

Recognizing the fact that the pupil of today will be the homemaker of tomorrow, the electrical industry of Los Angeles, Calif., under the auspices of the California Electrical Co-operative campaign, recently served a dinner to a part of the public school staff there. The meal was entirely cooked by electricity in the auditorium of the Los Angeles Evening Express. The guests included the members of the Board of Education, the superintendent of schools, and a staff of 300 teachers representing the Home Economics and Domestic Science Departments.

The purpose of this dinner was to call the attention of the departments to the necessity of instructing the student of today in the proper use of electricity in the home. Particular attention was paid to cooking by electricity and lessening the drudgery in the home by the use of various electrical appliances.

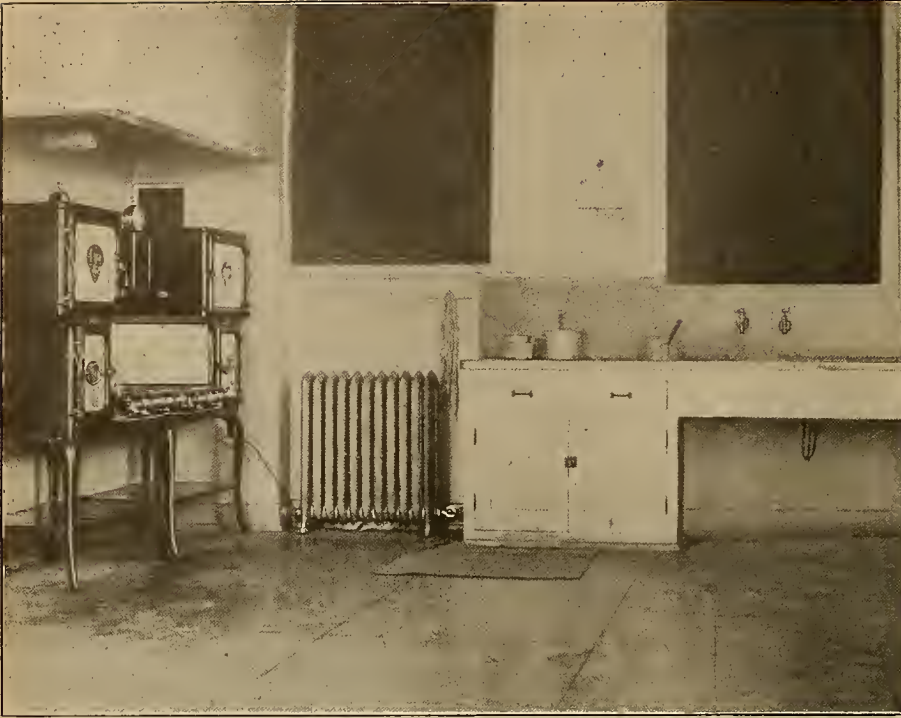
The citizens of Los Angeles, at an election held in June, 1922, voted favorably for the adoption of a \$17,500,000 bond issue to erect eighty new polytechnic, high and grammar schools and also for repairs and additions to some twenty-nine others. These schools are to contain the most modern equipment. Special attention has been given through the efforts of the electrical industry, to the proper wiring installation to meet not only the present but the future requirements. This will permit the fullest use of electricity in the domestic science departments, as it will operate various appliances, and in the future will heat these schools. It has been found in a number of instances, that in order to heat perhaps one room at night used by teaching staff members, it required the services of the janitor and the operation of the entire heating unit. This made it very costly, whereas the room or office could have been elec-

trically heated for temporary use at a much lower cost.

It was partly because of this intention of the City of Los Angeles to build the new school buildings that the electrically cooked dinner was served to the members of the teaching profession in the city. The leaders in the electrical industry in Los Angeles were desirous of getting the electrical idea before the educators in the best possible way. It was determined that a dinner at which talks on correct electrical installations could be presented would aid in showing the teachers the advantages of electricity. The dinner, it was thought, would serve a double purpose for it would educate the teachers and would place them in a position to pass their knowledge to their pupils.

K. E. Van Kuran, Los Angeles district manager of the Westinghouse Electric & Manufacturing Company, as vice-chairman of the Advisory Board of the California Electrical Co-operative Campaign, presided at the dinner served to the members of the Board of Education and the staff of teachers. In his opening remarks, he explained that the purpose of serving this dinner cooked by electricity was to afford an opportunity of explaining the advance and development that California was making in the generation of hydroelectric power. Mr. Van Kuran told of the plans of the hydroelectric companies of California, which call for an expenditure of approximately \$500,000,000 in the next decade in developing 6,000,000 hp. In addition to this he described the distributing and interconnected power systems of the West.

In his talk Mr. Van Kuran called the attention of the visitors to a booklet entitled, "A Glimpse of a Few Electrical Domestic Science Installations." This booklet was given to each guest as



In the Antelope Valley Union High School an electric range with two ovens and two broilers is installed in the girls' dormitory. The range aids in showing how electricity serves modern homes.

Times, each spoke of the advantages and economies of cooking by electricity and described the many sanitary advantages it possesses over any other fuel. They stated that there was no mystery or hazard in cooking by electricity and that it was no longer necessary for the housewife to cook in a heated kitchen. They noted the saving in the cost of utensils; the absence of all grease, soot and ashes. One of the speakers told of the lesser amount of shrinkage of meats and the more palatable condition of the foods cooked.

"Prudence Penny" of the Home Economics Department of the Los Angeles Examiner, in a short address, told the guests that the electric stove was not just a passing fancy, but that it was a device designed to lessen the work of cooking. She stated that hundreds of hotels and restaurants throughout the country are finding cooking with electricity to be the practical, economic way to most satisfactorily serve their patrons.

Miss Kate Drew Vaughn, who has charge of the Home Economics Department of the Los Angeles Evening Express, under whose direction the dinner was prepared, gave some very interesting details with reference to the preparation of the meal. She explained that so exact and steady is the temperature of an electric range that it has been possible to prepare charts known as "time and temperature charts" which give the exact time different food products require for cooking in ovens of a specific temperature.

Tables likewise have been prepared for the boiling of vegetables and the broiling of meats. When baking in an electric range, a woman can place her biscuits in an oven heated to a temperature of 500 deg. and without again looking at them, know that in 12 min. they will be thoroughly baked. Then she can go on with her housekeeping or go shopping, knowing that if she re-

turns 50 min. later her bread will be baked perfectly.

Miss Vaughn told the guests that the electric range offers to the woman doing the cooking a maximum of all the qualities which she desires within her kitchen. The fact that there are no fumes arising from the burning fuel, no flames to endanger clothing or be extinguished by boiling liquids, makes the electric range healthful. The woman will enjoy the perfect control on the stove for she can start a meal and then leave it, while she attends to some other

duty. It is conservatively estimated that there is a saving of from 10 to 20 per cent in the net weight of electrically cooked meats. To the careful housewife this means a great deal.

Miss Etta P. Flagg, supervisor of the Home Economics Department of the public schools of Los Angeles, said that a very convincing argument for the extensive use of electricity in the public schools was demonstrated through the fact that the students desire to use electric appliances. She stated that they preferred to use electrically heated cooking devices to any other type.

Mrs. Susan M. Dorsey, superintendent of schools of the City of Los Angeles, stated that the use of electricity for cooking in the home is a subject which should be given deep consideration by the educators of our growing children. It is her view that the extensive use of electricity as a fuel for cooking purposes will undoubtedly be in almost universal use by the time our younger generation assumes the duties of housekeeping. Mrs. Dorsey assured the members of the electrical industry that due consideration would be given to the suggestions as given in the various addresses of the evening.

The Los Angeles school department is regarded as one of the most progressive educational organizations in the entire United States. Its activities have been watched and followed by many others. The recognition by the school board of the advances that have been made by the electrical industry in making available electricity as the future servant in the American home, and its recognition of the desirability of teaching the "youth of the nation" to cook by electricity is a step in advance. The board's action will probably be followed by various school boards throughout the country where electricity is available.



Westinghouse ranges installed in the domestic science department of the Moor Park High School near Los Angeles. Thus the women of tomorrow are being taught the advantages of electricity in the home.

Reaching for the Appliance Customer's Pocket Book

Bisbee, Ariz., Dealer Mobilizes His Display of Christmas Gifts and Sells \$600 Worth of Equipment in One Week

When Mahomet discovered that the mountain would not come to him no matter how hard he endeavored to draw it his way, he determined, as the story goes, to go to the mountain. In the present-day electrical business many men of the industry have claimed that business does not come to them in the way that they would have it. To these men the story of Mahomet has evidently not brought its message. They may have heard but in many cases they have not heeded the advice given by Mahomet when he started in quest of the mountain.

Purchasers of electrical appliances are not mountains, but in some cases it has been found that the electrical dealer has as much trouble drawing them to his store as Mahomet had in bringing the mountain to him. One of the main ways of creating the desire of ownership in the mind of a possible purchaser of any device, is to show it to him in a way that will not inconvenience him. To do this is often hard, for in spite of the fact that the show windows of the electrical dealer are his most valuable advertising mediums, he may find that many people in the city in which he is conducting his business do not pass in front of his store.

It was for this reason that Eugene Stevens, manager of the Stevens Electric Shop, of Bisbee, Ariz., decided to go to the housewife who could not get to his store. Mr. Stevens realized that there were many women who did not have the opportunity to come to his store and he decided that he would take samples of his stock of appliances to them.

In displaying the appliance stock to the residents of Bisbee, a city of about 9,000 people in the southern part of Arizona, Mr. Stevens made no effort to conduct a house-to-house canvass of the city. He was interested principally in displaying his goods, and in that way

attracting customers to his store where an adequate display of the appliances could be made. The purpose was to produce a portable show window which could be transported throughout the residential districts.

Mr. Stevens started his campaign of transporting displays of electrical equipment through the streets of Bisbee the week before Christmas last year. It was his contention that buyers of Christmas gifts could be reached in this way when other ways would be non-productive. Buyers were in the market for electric appliances for gifts and it was only necessary for the dealer to display the devices to them in order to attract their attention to this class of goods.

To carry his goods to the housewife in her home, Mr. Stevens rigged up an automobile delivery truck, upon which he arranged a display of electric appliances so that they could easily be seen from either side of the street. This truck was then driven around the city and the signs, painted and suspended from the running boards and elevated over the entire display, notified the women who saw the truck of the place where the appliances could be purchased in Bisbee.

The reports of the Stevens Electric Company for this one week just before Christmas, show that the portable display was a decided success. During the week \$600 worth of appliances were sold in the city, and the company attributes much of this business to the interest that was created by the novel display.

To further increase the effectiveness of the traveling display truck, Mr. Stevens plans to install a small power plant so that electricity may be had for operating the appliances while they are on the truck. By this arrangement, it will be possible to conduct actual demonstrations of the appliances

at any place where the truck may stop. In addition to this, it is also planned to install a show case on the truck and then drive the truck through the streets at night. The same generating set will provide electricity to operate electric lights which will be used to illuminate the case.

The Stevens Electric Company has found that this method of displaying electric appliances is so productive of sales that it will continue the practice and as has been stated, plans to make improvements upon the original display. The idea is one which can be utilized by any electrical contractor-dealer who is desirous of increasing his sales, but it cannot be considered to be the only selling activity that the dealer will have to use.

Astoria Dealer Opens Store 12 Hours After Big Fire

That fire, flood or famine are not sufficient to cause the electrical contractor-dealer to be downhearted was demonstrated in Astoria, Ore., after the fire



A view of the temporary showcases of the McCartney Electric Company on the sidewalk in front of the company's store, which was completely razed in the Astoria (Ore.) fire.



The Stevens Electric Shop of Bisbee, Ariz., used this truck as a moving display window, during the week before Christmas and conducted a business in electrical appliances amounting to \$600.

that partially destroyed that city last December. The store and the stock of the McCartney Electric Company were both totally destroyed, yet the embers of the fire were hardly cold before the proprietor had a work bench and shelving up in the basement and was ready for business.

A long distance telephone call to the Fobes Supply Company in Portland resulted in the shipment by express of a quantity of necessary supplies, just twelve hours after the fire. This quick delivery placed the contractor-dealer in a position to be of real service to the community making temporary installations and connections in relief depots and other buildings.

Not to be outclassed by other stores of the city, the McCartney Electric Company put up a temporary showcase on the sidewalk for displaying such merchandise as was in stock. A large sized sign indicated that the company was far from out of business. In the accompanying photograph, the military looking figure with a gun was not hired for the purpose of guarding the McCartney stock, but was a national guardsman for the city was under temporary military rule.

INDUSTRIAL NEWS



Edison Company Will Add 30,000 Homes to Lines in 1923

Plans of the commercial department of the Southern California Edison Company, call for the connection of 30,000 new homes during this year which will use Edison service. This does not include the many thousands of new customers taking service from distributors who buy service from the company wholesale. On the customary ratio of five to one this means that 150,000 people will join the ranks of consumers in one year. This is greater than the population of many of the important cities of the country. It is interesting to note that every five minutes of the working day a new customer is added to the lines of the company. During the year the company plans to add 1,500 ranges and 500 water heaters, and to sign up a minimum of 100,000 hp. of new business.

Northwestern Electric Co. Lays Foundation for Plant

An item of construction of interest in the program of the expansion of the Northwestern Electric Company was the laying of an immense concrete slab weighing 1,259,550 lb., which served as the foundation for the giant turbines in the company's addition to its generating plant at the foot of Lincoln St., Portland. It took a crew of workmen, aided by ten auto trucks, more than 16 hours to pour the concrete. The slab is 4 ft. thick and approximately the size of one of Portland's down town quarter blocks. The work is being done by Parker & Banfield. The slab rests on a sub-foundation of 300 piles, each of which is sunk 55 ft. into the earth.

The plant will be in operation late this autumn and will add more than 12,000 hp. to the company's generating capacity.

Long-Bell Lumber Co. Orders Equipment for Power Plant

The Long-Bell Lumber Company recently placed a large order with the General Electric Company for the equipment of the first unit of their power plant. The order includes steam turbo-generators, exciters and switchboard material and is one-half of the ultimate capacity for which the plant is designed. A more complete description of the items is as follows: 3—7,500-kva., 3,600-r.p.m., 2,300-volt Curtis turbo-generators, the turbines of which will be designed for condensing operation with steam at 225 lb. gage and 125° F. superheat; 1—200-kw. dual-drive exciter set, the generator being driven by both an induction motor and

a small turbine; 2—350-kw. synchronous motor-generator sets with 275-volt d.c. generators. Battery charge sets, station service transformers, and a very complete switchboard equipment.

Shipment of all this equipment is promised before the end of 1923.

This installation will undoubtedly be the biggest of its kind in the Northwest. The contract for the erection of the power plant has been awarded to Charles C. Moore & Co. of San Francisco. Work will commence at once. The cost is unofficially estimated at \$2,000,000.

Coos Bay Lumber Company Plans Improvements at Marshfield

Preliminary work on extensive improvements in the electrical side of the Coos Bay Lumber Company's plant at Marshfield, Ore., has been started and the completion will depend on the delivery of special equipment from the East. The improvements proposed for the year, which will probably be completed within three or four months, will mean an estimated outlay of about \$250,000.

One of the first things will be the installation of a 6,000-kw. turbine, which will mean electrical production totaling 11,000 kw. maximum. It will also be necessary to increase the boiler plant whose present maximum is about 9,000 kw.

City of Seattle Plans Material Reductions in Rates

Reductions in city light rates in Seattle, ranging from six to ten per cent, are proposed in an ordinance introduced in the city council recently by the city utilities committee. The new rates for residence lighting are: First 40 kw-hr. per month, 5½c. per kw-hr.; the next 200 kw-hr. a month, 2c. per kw-hr. All in excess of 240 kw-hr. a month, 1c. per kw-hr. The present rates on this class of current are: 6 cents a kw-hr. for the first 45 kw-hr. and 2½c. for all in excess of 40 kw-hr. Rates for commercial lighting, which includes stores and offices, are cut an average of eight per cent below existing rates for this class of service.

No change is made in the rates for power current, except that a rate of \$1.12 per calendar month per kilowatt, computed on the basis of the customer's maximum demand in kilowatts for such calendar month, is fixed for "dump power" defined under the ordinance as surplus hydroelectric current in excess of all other demands, and which therefore would go to waste.

The ordinance also abolishes the \$1 charge now made for each new account.

Hood River Plant to Be Ready for Operation About May 15

The \$1,250,000 hydroelectric plant of the Pacific Power & Light Company, now being brought to completion by the Phoenix Utility Company, will be formally dedicated about the middle of May, according to L. A. McArthur, vice-president and general manager. The big plant, including a 10-ft. pipe line a little less than 3 miles long and a concrete dam, will be tied in with the Northwestern Electric Company's plant at White Salmon, Washington, and the bulk of energy developed will be distributed in Portland. The dedication services will be attended by numerous Portland officials and men interested in electrical development from various parts of the Northwest.

Idaho Power Company Will Issue \$3,200,000 in Bonds

Authorization of the issuance of \$3,200,000 first mortgage 25-year gold bonds, the proceeds of which will be used to refund a like amount of outstanding notes, has been voted by the board of directors of the Idaho Power Company. The bonds, which will be secured by a first mortgage on the property holdings of the company, will mature Jan. 1, 1947.

A dividend of 1¼ per cent was declared on all outstanding preferred stock of the company, payable May 1.

The directors also authorized the payment of \$3,299,000 of notes of the company, part by the bond issue and the remainder from other sources. The bonds were taken up by Harris, Forbes & Company of Boston and New York.

Industrial Heating School Will Be Held in Boston

A school in industrial heating for members of the sales departments of central stations will be conducted by the Industrial Heating Division of the Power Sales Bureau of the National Electric Light Association in Boston from May 14 to 26. The school will be similar to that held last year when 35 power sales engineers were given a thorough course in industrial heating. It has been estimated that the revenue from an average industrial heating installation is almost double that of an equal motor load and active steps are being taken by power companies for increasing this character of load. Already there have been twenty enrollments for this year's school. Central station executives who are planning to send men to the school are asked to communicate with V. M. F. Tallman, vice-chairman, Power Sales Bureau, N.E.L.A., Charles H. Tenney & Company, 200 Devonshire St., Boston, Mass.

Work Progressing Rapidly on Big Creek No. Three

Largest Hydroelectric Plant West of Niagara to Be Placed in Operation Oct 1 by Southern California Edison Co.

Construction is under way on the superstructure of the fourth power house on the Southern California Edison Company's Big Creek project, known as Big Creek plant No. 3, and the plant will be completed and in operation by Oct. 1 of this year. The first installation of three units in the plant will develop 100,000 kw., and its ultimate capacity will be double this amount. The power will be transmitted to Los Angeles, a distance of 240 miles over the first commercially operated 220,000-volt transmission line in the world. The completion of this plant will mark the consummation of the fourth step in the Edison Company's Big Creek project, which contemplates the development of 1,400,000 hp. during the next ten years from the water courses of the high Sierra in central California, at a cost of \$375,000,000. During 1923 the company will spend \$26,000,000, which includes besides the work on the Big Creek project, large expenditures for transmission lines, distribution lines, substations and other construction. Over 4,000 men are now engaged on the various phases of the Big Creek development, with a daily payroll of \$35,000.

The initial installation in this new plant will consist of three 35,000-hp. vertical turbines built by the Wellman-Seaver-Morgan Company, operating at a speed of 423 r.p.m., and under a head of 760 ft. The generators are being furnished by the Westinghouse company. They will be rated at 25,000 kva., 11,000 volts, 50 cycles, and will have direct connected exciters. A novel feature of the plant will be the omission of a separate lubricating oil system. In

this installation each bearing of the main units will have its own lubricating oil pump, thus eliminating all outside oil filters, pumps, supply tanks and piping, which are liable to cause trouble in operation.

The building will be 200 ft. long, 139 ft. wide, and 110 ft. high from the tail-race floor to the roof, and will be of reinforced concrete and structural steel. A feature of the building design is the elimination of the basement in the generator room. As the plant is laid out, the operating floor will be on two levels, one at the base of the generators, and the other at the elevation of the turbines, so that practically all of the equipment will be in view of the operator at all times. The switching station will be 195 ft. wide and 430 ft. long, and will consist of a series of concrete benches placed on the slope of the mountain, there being a difference in elevation of 46 ft. between the upper and lower benches. These benches will support the 220,000-volt transformers, oil switches, buses, etc.

The penstock for the turbines will be made entirely of lap welded pipe, varying in diameter from 7½ ft. to 6 ft. The valves at the bottom of these lines will be of the needle type manufactured by the Wellman-Seaver-Morgan Company. At the upper end of the penstocks butterfly valves 7½ ft. in diameter will be installed and arranged for control from the power house. At the upper end of the penstocks there will be installed a manifold of special design, which will connect the six penstocks of the ultimate installation with an 18-ft. steel pipe connecting to the tunnel. At this location there will also

be installed a surge tank excavated from the solid rock. This surge tank will have a shape similar to an hour glass, the largest portion being about 75 ft. in diameter. This surge tank will relieve the penstocks and tunnel line from all possibility of damage due to variations of pressure in the pipe line.

The 21-ft. diameter tunnel leading from the intake at the diversion dam to the penstocks is 30,000 ft. in length. It has been excavated on a slope of three feet per thousand, and has a carrying capacity of 3,000 sec.-ft. The flow of water into the tunnel will be regulated by a 22-ft. diameter circular sluice gate, which was designed by the company's engineering department. The diversion dam is a simple arch type concrete structure. The maximum height of the dam from bedrock to crest is 134 ft. Four 7-ft. square sluice gates, having a combined discharge capacity of 3,000 sec.-ft., are installed in the dam. The dam and tunnel intake are located at the junction of Big Creek and the San Joaquin River, and the power house is approximately six miles downstream at the junction of Mill Creek and the San Joaquin River.

Actual construction work on the new plant will require only 141 days, and the first generating unit will be placed in operation about August 1, and will be followed by the second unit about Sept. 1, and it is expected that the entire plant will be completed and the power placed on the 220,000-volt transmission system by Oct. 1, of this year.

Highway Lighting Installation Being Tried in Utah

The good roads committee of the Salt Lake City Chamber of Commerce, state, county and city officials, and many others interested in highway matters recently attended a demonstration of a new system of highway lighting on the Salt Lake-Ogden highway just north of Salt Lake City, Utah.

This experimental system, which consists of 15 General Electric Company highway units, of 250 cp. each, spread over a distance of about a mile, with a spacing of from 350 to 400 ft., was installed at the instance of the good roads committee of the Salt Lake City Chamber of Commerce, and the state highway commission. The particular site selected for the demonstration was chosen because it presents the three most difficult problems in highway illumination—a curve, a hill and a railroad crossing. The lights burned each night for a period of two weeks in order that the merits of the new system could be fully demonstrated. The experimental system was installed by engineers of the Utah Power & Light Company and the General Electric Company.

Alleys in the business section of Denver will be lighted for the first time as the result of a recent ordinance passed in that city providing for the installation of two 400-cp. lamps about 100 ft. from each of the abutting streets. Surveys have been completed by the Denver Gas & Electric Light Company and the installations will be made as soon as equipment is available. The improvement is intended to give additional protection to business houses against prowlers and to aid the policemen patrolling alleys at night.



J. L. Stannard (left), chief engineer of the Cushman power project, Ralph Hillgrass, chief district forester, and Llewellyn Evans, superintendent of the Tacoma light department, on a snowshoe trip up the Skokomish River, inspecting the watershed of the proposed Lake Cushman power development which the city of Tacoma

has under way. The trip was made primarily to obtain an idea of the run-off conditions of the basin, and found that because the mountains are so rugged, with such bare and steep sides, that when the snows melt, the water runs off rapidly without much loss into the ground. The engineers found 6 feet of snow at 2,000-ft. elevation.

City of Seattle Planning More Complete Street Lighting

Seattle's streets, already considered among the best-lighted in the world, are to be further illuminated, according to plans under way by Superintendent of Lighting J. D. Ross, who is chairman of the lighting and decorations committee of the general tourist committee of the Seattle Chamber of Commerce. Mr. Ross states that present plans provide for better lighting on the docks, and improved general lighting in the downtown section. A special flood lighting system for downtown buildings is being worked out, current for which will be furnished to building owners at very low rates. The city light department is considering the installation of flood lighting for some of the downtown canyon streets and colored lighting effects are also being considered. The plans are part of the general scheme for welcoming tourists this summer, and include electrically lighted welcome arches at the highway entrances to the city, flood lighting at the community house in the auto tourist camp, and special interior lighting for the community house.

Two San Francisco Jobbing Firms Effect Consolidation

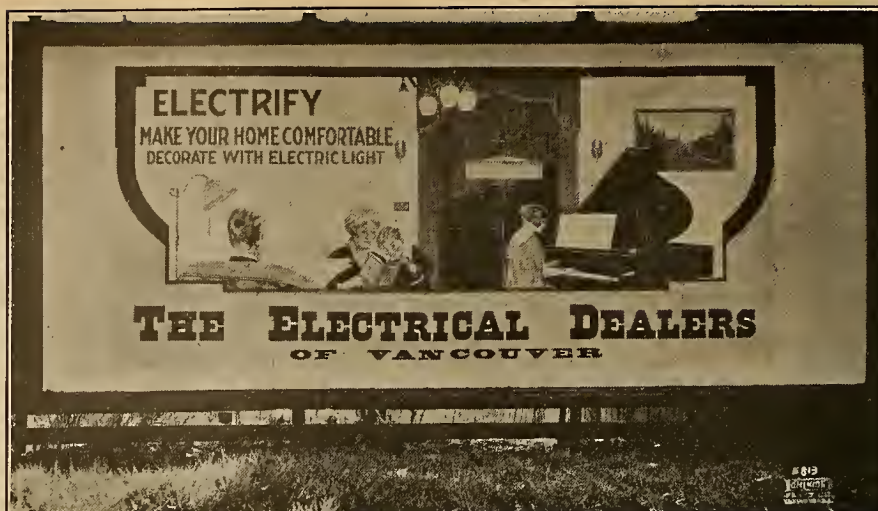
An important combination of jobbing interests in California occurred on May 1, 1923, with the consolidation of two San Francisco firms, the Electric Railway & Manufacturers' Supply Company and Fobes Supply Company, under the firm name of the Fobes Supply Company. The joining together of the personnel and merchandise stocks of these two houses has resulted in the formation of a new concern with a large organization and branches in San Francisco, Oakland, Portland and Seattle.

Of equal importance is the announcement that on May 1 the new concern will move into a spacious new building at 260 Fifth St. The building is planned and laid out with every thought centered on doing the job of wholesaling electrical goods most efficiently.

The officers of the new company will be F. N. Averill, president; R. J. Holterman, general manager; B. S. Manuel, sales manager; R. F. McDonald, assistant sales manager, and E. J. Duggan, purchasing agent.

The Electric Railway & Manufacturers' Supply Company was organized in 1898 by Samuel Taylor, now president of the Safety Manufacturing Company, and Allen Bowie, as a successor to the firm of Reger & Atwater Company. It was the pioneer electrical jobbing house of San Francisco. Mr. Taylor later acquired complete control of the firm and in May, 1920, sold his interests, remaining connected with the firm as president until March, 1922.

The Dixie Power Company of Salt Lake City, Utah, has applied to the Utah state engineer for permission to divert 30 sec.-ft. of water from the Santa Clara River, in Washington County, for the purpose of generating 800 hp. of electrical energy. The channel which will divert the water will be 30,450 ft. in length and a 5-ft. Pelton wheel will be used in generating the power.



One of the ten billboards advertising the electrical dealers, which are displayed by the central station in Vancouver, B. C.

B. C. Electric Co. Cooperates With Dealers in Advertising

Ten billboards designed to direct the attention of the public toward the electrical dealers in Vancouver, B. C., are being displayed in that city by the British Columbia Electric Railway Company, Ltd. The cost of this advertising is paid by the central station. The

company has adopted this policy of advertising the dealers in order to inform the public that there are other electrical interests in the city aside from the central station. Although in the merchandising business itself, the company realizes that every appliance sold, whether by one of its offices or by a dealer, means additional load on its lines.

Northwestern Electric Co. Will Build Transmission Lines

The Northwestern Electric Company will start the immediate construction of a 66,000-volt high line into Vancouver from Camas, Wash., and will extend its 11,000-volt industrial lines into both the east and west side industrial districts of Portland, according to E. T. Merwin, vice-president and general manager of the company, who returned recently from conference with executives in San Francisco. Instructions to put augmented crews to work on the Vancouver high lines have been issued and the 18-mile gap between the main line at Camas and its Vancouver terminus will be rushed to early completion. At Vancouver the current will be stepped down to 11,000 and 2,400 volts for distribution among industrial plants in Vancouver. Construction of the Vancouver high line branch is part of the company's \$500,000 expansion program planned for this summer.

The first issue of "Edison Partners," an eight-page illustrated quarterly pamphlet sent to stockholders, employees, and the general public, by the Southern California Edison Company has made its appearance. The purpose of the publication, according to President John B. Miller, is to acquaint those financially and otherwise interested in the welfare of the company with what it is doing to keep abreast of the rapidly increasing demands for electrical service in southern California.

Electric service will shortly be provided Gypsum, Colo., and adjacent territory by the Eagle River Electric Company, recently incorporated by Harrison L. Shaffer, B. L. Whitesell, and Otto A. Erdman, residents of that community.

Washington Legislature Passes Reed Power Sale Bill

With no arguments against the Reed bill passed by the last Washington Legislature, which gives municipalities permission to sell their surplus electric power outside the city limits, the bill, which carries the referendum clause, will go to the people of the state at the next election. This measure was the bone of contention throughout the legislature and was finally passed in amended form upon free conference report in the closing hours of the session. It gives municipalities the right to sell electrical energy generated from municipal plants outside the city limits and imposes a 5 per cent gross revenue tax upon gross receipts from sales both within and without the city limits. The tax does not apply to cities not generating their own current.

The board of water commissioners of Denver, Colo., has ordered three large De Laval pumping units to be installed as a part of the Denver water supply system. The order, which was placed with the Advance Machinery and Supply Company of Denver, calls for one 4,000,000-gal. electrically driven unit for the South University Park Station, one 8,000,000-gal. electrically driven unit for the Ashland Avenue Station and one 10,000,000-gal. steam turbine driven unit for the Park Hill Station.

Electrification of the Willapa Lumber Company's plant, located at Raymond, Wash., at a cost of \$85,000, was decided upon by the board of directors at a recent meeting. In addition to the replacing of the present steam engines with motors, the plan calls for increasing the output of the plant.

Annual Electrical Convention Held in Salt Lake

Rocky Mountain Electrical Cooperative League Sponsors Meeting at Which Importance of Cooperation Is Emphasized

By M. L. CUMMINGS, JR.

The second annual convention of the electrical interests of Salt Lake City and adjacent territory was held on April 6 at the Hotel Utah, Salt Lake City, under the auspices of the Rocky Mountain Electrical Cooperative League. Approximately one hundred members, representing various branches of the industry, were in attendance.

The first session opened at 2 p.m., and was presided over by W. A. Moser, manager of the Salt Lake office of the Westinghouse company, and chairman of the Rocky Mountain Electrical Cooperative League.

In a brief address Mr. Moser introduced Sidney W. Bishop, executive manager of the Electrical Cooperative League of Denver, as the principal speaker.

Mr. Bishop chose as his subject "Putting Cooperation to Work," and covered many interesting phases of league and electrical matters. He pointed out how the electrical industry particularly is in need of team work in solving the many problems which it faces today—the team work of all its various branches. That the West can be given credit for the great development which has been made thus far in the industry, was his assertion.

He emphasized the necessity of educating the public to the many uses of electricity, and stated that the surface had barely been scratched in this work. "The big thought in getting the idea over to the public, of what we are trying to do, is one of education. Education is the breaking down of the barrier of resistance, and service is the giving of satisfaction after that barrier has been removed. There is where one of the greatest responsibilities of the electrical industry lies."

Mr. Bishop stated that the utilities, especially, throughout the country, are now following a program of building good-will through education, with the thought that this will, if successful, solve one of their big problems. He called attention to the work of the Joint Committee for Business Development, and outlined the plans under which it expects to accomplish very good results in building up the electrical industry.

In commenting on the uses of electricity in the home, Mr. Bishop stated that the electrical men are not getting the returns that they should from this source, and that the idea has not been sold sufficiently to the public. He pointed out the very small percentage represented by expenditure for electrical work in the average home, as compared with some of the other items of building cost. The opportunity for increasing the number of convenience outlets by systematic and intensive educational work was strongly emphasized by the speaker. Appliance sales could be greatly increased, he said, by co-operation, concentration, advertising, education and intensive selling.

Mr. Bishop referred to a study which had recently been made in San Francisco, resulting in establishing a figure of \$20.60 as the average income to the electrical industry for each new outlet over a period of five years—illustrating the wonderful possibilities for increased revenue to the contractor, dealer and power company from such source.

The evening session, at 6:30 p.m., was largely attended, opening with a banquet. W. A. Moser introduced J. A. Kahn, president of the Capital Electric Company, as toastmaster.

Melvin H. Sowles, vice-president of Walker Brothers, bankers of Salt Lake City, was the principal speaker. Mr. Sowles spoke on the subject of general financial and business conditions, and outlined some of the features of the new Rural Credits Act recently enacted by Congress. He touched upon some of the underlying factors in connection with the present business conditions, and pointed out the necessity of aiding the farmer as one of the principal steps in the direction of the return to prosperity.

One of the features of the evening session was a lecture by E. A. Evans, of the Salt Lake City office of the Westinghouse company, and L. B. Johnson of the Salt Lake City office of the General Electric Company, on the subject of "Proper and Improper Store and Window Lighting."

By means of lantern slides showing charts and pictures, Mr. Evans showed vividly the contrast between good and poor window lighting, and pointed out the value of good lighting to the merchant as a business proposition. He gave a very interesting demonstration.

The entire program, both afternoon and evening, was exceedingly interesting and instructive. The get-together spirit was very much in evidence, and the discussions resulted in the exchange of many valuable ideas.

Colorado Tourist Camps Will Be Electrically Lighted

A movement is on foot in Colorado to make the tourist camp grounds of the state the lightest, brightest and most attractive spots in the United States. Instead of requiring visitors who arrive at night to grope their unfamiliar way about the grounds in search of wood, water and desirable places to set up camp, it is the plan to electrically light the whole campground area.

Denver, which boasts one of the best lighted tourist camps in the nation, and Longmont, which is a close competitor for this honor, have been the inspiration for other towns who are striving to make their tourist camps so attractive that visitors will want to tarry. It has been determined that auto tourists remain from two to ten days longer in municipal camps that are well lighted, well watered and which have plentiful supplies of wood.

The Electrical Cooperative League of Denver is now taking a census of Colorado tourist camps, with a view to ascertaining how many of them are electrically lighted by the towns which support them.

There are 213 auto tourist camps in the state and the more progressive towns, where the value of tourist trade is appreciated, are making strenuous efforts to do everything possible to attract visitors. In Longmont a number of electric ranges have been installed. Dozens of desirable individual camping sites are illuminated with individual electric plants.

Ne Page-McKenny Co. Will Build Seattle Transmission Line

On a bid of \$268,000, the Ne Page-McKenny Company, Armour Building, Seattle, received the contract for construction of the proposed transmission line from the Gorge Creek plant of the Skagit project to the North Substation at the Seattle city limits. The transmission line will be 100 miles long. It will be a 165,000-volt line, with a capacity of 112,000 hp. Contract for the line provides for completion within six months' time, the city furnishing most of the material involved, including wire, poles and cross-arms. The low bid was that of Grant, Smith & Company, Seattle, \$424,100.

E. A. Thompson, local manager of the Fort Lupton (Colo.) Light & Power Company, believes that Johnstown, Colo., one of the communities served by his company, has established a record for the United States, if not for the world, in having every one of its 350 homes wired for electricity.



View of the banquet held in conjunction with the second annual convention of electrical interests in the Intermountain Region at Salt Lake City.

Technical Sales Problems to Be Handled by Engineer

The Capital Electric Company of Salt Lake City, Utah, has inaugurated a policy whereby their technical sales problems will be handled by a competent engineer. They have organized a Transmission and Street Lighting Department which is in a position to go into the engineering features of their customers' problems.

This department has been placed in charge of K. V. Laird. Mr. Laird is an experienced electrical engineer and a graduate of the University of California. He was formerly employed by the Anaconda Copper Mining Company, of Montana, and was also associated with the Gellert Engineering Company of Philadelphia, Pa.

Denver Man Urges Importance of Public Utility Advertising

George E. Lewis, executive manager, Rocky Mountain Committee on Public Utility Information, with offices in Denver, was one of the speakers at the Middle-West Division of the National Electric Light Association during its first annual convention in St. Louis, April 10-11-12. Mr. Lewis also spoke before a meeting of the directors of a dozen committees on public utility information.

"Selling the Public Utilities to Their Customers" was the subject of a talk given by Mr. Lewis before both bodies. As director of the Rocky Mountain Committee on Public Utility Information, Mr. Lewis for more than a year has been specializing in public utility good-will advertising. This committee has been instrumental in converting dozens of electric and other public service companies in its territory to advertising as a means of winning public confidence and establishing a friendly understanding with customers.

Mr. Lewis told the convention delegates that where but one public service company advertised for good-will in his territory one year ago, there are now two-score organizations regularly prosecuting this form of newspaper advertising. During the course of his address Mr. Lewis said:

"It is no longer a question of advertising for advertising's sake; competition is responsible for the large amount of advertising that the public utility companies are doing in the Rocky Mountain region. The competition I refer to is that of the demagogue, the misinformed, the antagonistic. These have out-advertised the public utility industry in the past. By word of mouth, chiefly, they have broadcasted their distorted, erroneous and unfair views to such an extent that they have succeeded in selling their ideas to a large part of the public, including the customers of the public utility companies.

"Every day the public utility, whether it realizes it or not, is in direct competition with the thriving industry of condemnation—condemnation of service, rates and the general deportment of the public utility. The other businesses combat their competitors with every available means at their command—publicity, advertising, better service and other established methods—the public

utility business, since its inception, has been notoriously lax in competing with rivals far more dangerous and unfair than those with which the ordinary business must contend.

"Today the public utility industry, with nothing to hide and with every qualification that comes within the realm of the high standards established by the Associated Advertising Clubs of the World, which are the outposts and sentries for honest advertising, must outdo those who are against it. The utility industry must not only outdo existing competitors, but must overcome the lead obtained in the past by its enemies who were advertising while the utility business slumbered or carelessly ignored impending dangers."

Books and Bulletins

INTERIOR WIRING

By ARTHUR L. COOK, Department of Industrial Electrical Engineering, Pratt Institute. Second edition. 458 pages. 4¼ by 7¼ in. 250 illustrations. Flexible binding. \$3. Published by John Wiley & Sons, Inc., New York.

This book constitutes a guide to modern practice in electric lighting and power applications, and in the design and application of wiring for such purposes. In the revised edition the author has incorporated the latest changes in the National Electrical Code rules, the most important of which are in the overload protection of motors, approval of the use of varnished cloth insulation on wires and of renewable fuses and changes in the requirements for grounding circuits. Another valuable feature of the book is the method laid down for determining the size and arrangement of lighting units and for estimating the size of motors required for various classes of service. The range of material covers the needs of the practical electrician, the style is clear and the illustrations are particularly good.

RATE-MAKING FOR PUBLIC UTILITIES

By LAMAR LYNDON. 209 pages. 5½ by 8 in. \$2. Published by the McGraw-Hill Book Company, Inc., New York.

The subject of a fair and proper charge for the services of a public utility is one that is of unusual interest at this time. A book, therefore, which will assist in the understanding of the factors which make up a rate should be welcomed. The wide experience of the author in valuation of properties and rate-making together with the study of numerous authorities, decisions, and works on the subject have been combined in the text and the conclusions are set forth in a very clear manner. It is the intent of the book to point out the logical and exact conclusions for each factor which enters into the consideration of valuation and rate-making. As stated by the author: "The reasons for them are set forth in detail and any engineer or properly qualified investigator can choose between acceptance of these findings or offer better reasons for rejecting them."

The subjects covered by the thirteen chapters cover the general theory of rate-making, depreciation, to which 43 pages are devoted, methods of valuation, the rate of return, operating costs and rate-making for gas supply, electric supply, electric railways and telephone service.

In a number of places throughout the book certain court and regulatory commission decisions have been cited, but this procedure is not carried to a point which would prevent the reaching of definite conclusions by the reader.

The chapter on depreciation and the four chapters on rate-making are quite thorough, as the author works out mathematically a number of concrete problems and goes into detail to show the methods used to obtain certain values.

As an appendix a few pages are devoted to regulations promulgated by the Public Service Commission of Massachusetts for earnings of one of the utilities of Boston.

The work should prove valuable as a text book covering the elements of rate-making and as a means of reference for practicing engineers.

E. R. S.

EMF ELECTRICAL YEAR BOOK FOR 1923 IS PUBLISHED

The second annual edition of the "EMF Electrical Year Book" has been issued by the Electrical Trade Publishing Co., Chicago, Ill. This is a combined dictionary, encyclopedia and trade directory of the electrical industry. Of its original 14,000 or so topics nearly half have been entirely rewritten or completely revised. Several thousand new topics have been added. The definitions cover all electrical terms of both theoretical and practical interest. Among encyclopedia topics are facts and useful data on each branch of the industry; topics dealing with the chief lines of development and of equipment; nearly 100 biographies of electrical men; lists with data of electrical associations, colleges, periodicals, libraries, and laboratories. Included in the trade directory feature are some 3,150 classes of electrical products, each with lists of its manufacturers; there are also separate entries under the names of each of the manufacturers and their trade names. A staff of 36 contributors aided in compiling the technical topics of the new book. There are hundreds of topics dealing with hydroelectric and steam-electric plants, transmission and distribution lines, and other matters of interest to electrical engineers and executives connected with power companies. The new book is a large volume (9 by 12 in.), of 1,030 pages of text and over 200 pages of advertising. It is attractively bound and its subscription price is \$10.

Benn Brothers, Ltd., 8 Bouverie St., London, have recently published the Electrical Trades Handbook and Directory for 1923. The book contains lists of British power projects, both developed and projected, British, Colonial and Continental power companies, British and foreign electrical railways, electrical manufacturers and engineers. The price of the book is 10 shillings, net.

Meetings

Salt Lake City Engineers Hold Interesting Weekly Meetings

At the regular weekly All-Engineers' luncheon, held at the Salt Lake City Chamber of Commerce on April 9, Miss Clotilde Grunsky and C. E. Grunsky were guests of honor.

Mr. Grunsky, in a short talk, conveyed the greetings of the civil engineers of San Francisco to the members of the engineering profession in Salt Lake City. He outlined briefly some of the recent activities, and some of the proposed future activities of the American Society of Civil Engineers, and stated that it was his intention to recommend Salt Lake City as the place for the 1924 convention of the irrigation division of the society.

R. A. Hart, senior drainage engineer of the U. S. Department of Agriculture for this district, was the speaker of the day. Mr. Hart, who has recently returned from a trip to Hawaii, where he went for the purpose of investigating drainage conditions, spoke very interestingly on the subject of "Some Aspects of Engineering in Hawaii."

H. E. Clement, mining engineer, of Salt Lake City, presided at the luncheon, which was attended by more than fifty members of the various branches of the engineering profession.

These weekly luncheons, held every Monday, and known as the All-Engineers' luncheons and meetings, are well attended, and provide a very satisfactory method of getting together for the engineering fraternity of the city.

Electric Heating Is Discussed Before San Francisco League

Every phase of electric heat was presented to members of the San Francisco Electrical Development League at a recent meeting when eight experts on the subject addressed the league members. The meeting was one of the most noteworthy in the history of the organization from an educational standpoint. W. Wesley Hicks acted as chairman of the day.

The first speaker on the program was U. G. Brown, construction engineer of the Matson Navigation Company, who read a paper on "Oil versus Electricity in the Matson Building." Mr. Brown pointed out that oil was finally chosen as the fuel for heating the new Matson Building after careful tests had been made with electricity, which showed that heating the structure by electricity would cost approximately \$3,000 per year more than oil at the prevailing power company rates.

E. Earle Browne, of Browne-Langlais Company, discussed electric heating from the standpoint of the electrical contractor and pointed out some of the construction features necessary for a proper electric heating installation.

A. Strauch, electric heating specialist, traced the history of electric heating and cited a case in 1906 where many homes in one community were com-

pletely equipped for heating, cooking and lighting.

That the time will come when it will be possible for the majority of homes to be electrically heated throughout was the prophecy of A. J. Kercher, consulting engineer. He explained the steps which must necessarily be taken before this prophecy can become a reality.

The attitude of the fire underwriters toward electric heating was presented by R. J. Larabee, district engineer for the Underwriters' Laboratories. He discussed the fire losses attributable to electricity and pointed out how these are diminishing.

A. J. Moyle of the Chester N. Weaver Company, automobile dealers, told of the experience his company has had with electric heating. The firm's shops, offices and salesrooms are heated by electricity and this type of heating has proven entirely satisfactory, according to Mr. Moyle.

Frank Woodward, general sales manager of the Great Western Power Company, explained the power company attitude toward the heating load and cited some of the experiences his company has had with apartment houses which are heated with electricity. The characteristics of an electric heating load were discussed by Don Ray, assistant manager, commercial department, Pacific Gas & Electric Company. Mr. Ray compared the revenue derived from heating loads with those from other characters of service, indicating that this type of load was particularly desirable.

COMING EVENTS

Southwestern Public Service Association—
Annual Convention—Fort Worth, Tex.
May 15-17, 1923

National Electric Light Association—
Annual Convention—New York, N. Y.
June 4-8, 1923

Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923

Northwest Electric Light and Power Association
Annual Convention—Seattle, Wash.
June 27-30, 1923

Rocky Mountain Division, N.E.L.A.—
Annual Convention—Glenwood Springs, Colo.
Sept. 17-19, 1923

American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Oct. 2-5, 1923

Electric Club Is Organized at Wenatchee, Wash.

Power company representatives and electrical men of Wenatchee, Wash., met at an informal dinner on March 22, for the purpose of organizing a local electric club. The organization effected meets a long-felt want for a body through which electrical interests and the power company may cooperate to give better service in the community. Ray U. Muffley, manager of the Washington Coast Utilities, was elected temporary chairman. The following officers were elected: president, Lewis Shreve; vice-president, V. R. Wright; secretary, W. A. Buttles; and treasurer, H. L. Clark.

Denver League Entertains Real Estate Exchange at Meeting

A double-header event in the form of a "telephone party" and an "electrical day" with the Denver Real Estate Exchange was featured by the Electrical Cooperative League in the Mile High City, April 17-18.

Celebrating the activity of the Mountain States Telephone & Telegraph Company as members of the organization, the league featured its regular quarterly dinner-meeting with entertainment and a switchboard demonstration provided entirely by employees of the telephone company under the direction of Dean D. Clark, Denver commercial manager and member of the league advisory board.

John F. Greenawalt, director of publicity for the company and one of the veteran "good-will" builders of the mountain region, said that he was asked to perform as the principal speaker of the evening and the talk which was given, according to reports from Denver, proved a masterpiece in favor of good citizenship and service by all branches of the electrical industry.

An educational moving picture entitled "Behind Your Telephone," which was produced in Denver, was shown for the first time to the industry.

John J. Cooper, chairman of the league, presided at the Realtors' meeting on April 18 at the Denver Civic and Commercial Association with which was combined the regular weekly advisory board meeting of the league. Following the practice established last year, the meeting was devoted to the exposition and discussion of electrical subjects most likely to be of interest to those real estate men engaged in building activities.

Mr. Cooper reviewed the developments and progress of electricity and its application to the point where the educational program of the industry as a whole might be explained by S. W. Bishop, executive manager of the league. The latter presented the problems in relationship to the conditions found in Denver and the effort which is being made through cooperative effort to provide a solution and thus better serve the public.

F. J. McEniry, league field representative, and well known among Denver realtors, and George W. Bixler, director of publicity for the Denver Gas & Electric Light Company, also gave short talks.

M. Elliott Houston, president of the real estate bureau, had previously been an honor guest at one of the league luncheons at which time he expressed his appreciation for the development work done by the electrical organization and extended the official invitation to cooperate in the holding of a joint meeting. As a result of these personal relationships, an extremely helpful spirit has been developed, it is said.

Under an agreement reached between officials of the Douglas (Ore.) County Light & Power Company and The California Oregon Power Company, an immediate survey will be started by engineers of the latter company with a view of taking over the smaller utility at the end of a 60-day period.

Personals

A. B. West, vice-president and general manager of Southern Sierras Power Company and the Nevada-California Electric Company, has been named president of the Southern Sierras Power Company, to succeed the late



A. B. WEST

Guilford S. Wood of Denver. Mr. West was graduated with the class of 1899 from Stanford University, later taking a two-year post-graduate course in law. He became junior member of the law firm of Potter and West in Denver several years later. This firm was at that time acting as general counsel for the Nevada-California Power Company. When this company decided to enter the southern California field, Mr. West was transferred from the legal to the operating side of the business as vice-president and assistant to Delos A. Chappell, the president. He has been associated with the company during its remarkable growth and has had an active hand in developing the southernmost portion of California. He has taken an active interest in the affairs of the Pacific Coast Electrical Association, having served as president of the organization. Coincident with the announcement of Mr. West's election to the presidency of the company, came the announcement that Fred O. Dolson, general superintendent, and E. B. Cridle, general agent, had been appointed vice-presidents of the company.

Nathan Levinson, radio specialist, Pacific district, Western Electric Company, is in Los Angeles in the interest of his company. Mr. Levinson is particularly interested in the development of the Western Electric public address system and has installed this system at several large banquet halls for temporary meetings.

J. W. Mahoney, secretary of the San Francisco Electrical Development League, recently spent a few weeks in Los Angeles. Mr. Mahoney is chief of the order department of the General Electric Company's San Francisco office and went to Los Angeles to install a new system in that office of his company.

Norman Read, vice-president and general manager of the Colorado Power Company, and past chairman of the Denver section of the American Institute of Electrical Engineers, presented a highly interesting paper on the "Construction and Operation of a Transmission System" at a recent meeting of the Denver section of the Institute. The paper has been entered in the prize competition of the A.I.E.E. and is based upon Mr. Read's personal experience during the past ten years in connection with transmission lines in the Rocky Mountain district.

Howard S. Snell has been appointed chief engineer for the Montana Public Service Commission to fill the vacancy caused by the resignation of James H. Bonner. Mr. Snell comes to the Montana commission with twelve years' experience in public utility work. He was engineer for the public service commission of Kansas for three and one-half years and was consulting engineer for the Kansas City, Mexican & Orient Railway Company. He has had five years experience in valuation of utility properties.

Calvin Rice of New York City, secretary of the American Society of Mechanical Engineers, made a tour of the West addressing various engineering organizations before going to Los Angeles to participate in the regional meeting of the society to be held April 16-18, 1923.

Herbert Nunn, Oregon state highway engineer, has resigned to open offices as a consulting engineer in Portland. During his six years as highway engineer Mr. Nunn supervised the construction of 5,010 miles of public highway in Oregon.

Dr. Robert A. Millikan, chairman of the executive council of the California Institute of Technology and director of the Norman Bridge Laboratory, is in the East attending a number of scientific meetings. He has already addressed the American Institute of Electrical Engineers in New York and will speak at the annual meeting of the Carnegie Institute in Washington. While in Washington he will attend the meetings of the National Academy of Sciences, the National Physical Society and the National Research Council. It will be remembered that Dr. Millikan was recently awarded the Edison medal for distinguished electrical research.

J. C. Jones of the Los Angeles office of the Westinghouse Electric & Manufacturing Company, has been made manager of the central station division in that territory and will also have charge of the sale of supply apparatus for the company. Other changes in the personnel of that office include the appointment of G. B. Kirker as manager of the transportation division, which was formerly the railway division. R. A. Hopkins will have charge of the newly created engineering division.

B. E. Torpen has been appointed to the engineering staff of the City of Tacoma to fill the post of hydraulic engineer in connection with that city's Lake Cushman hydroelectric project. H. A. Cole and J. G. Eernisse will fill the posts of assistant mechanical engineer and assistant electrical engineer, respectively, while Lloyd Joubert has joined the staff as an engineer in the electrical department.

P. H. Affolter, of the Garland Affolter Company of San Francisco, was a recent Los Angeles visitor.

W. S. Hodgson, formerly assistant secretary and treasurer of the Utah Power & Light Company, has accepted a position with the Electric Bond & Share Company of New York. R. H. Jones succeeds Mr. Hodgson with the Utah company.

W. E. Creed, president of the Pacific Gas & Electric Company and also of the Columbia Steel Company, recently inspected that company's operations in Utah where steps are being taken for the establishment of a large steel producing center.

William H. Crawford, at present manager of the Department of Industries of the Portland (Ore.) Chamber of Commerce, has resigned to become affiliated with The California Oregon Power Company. He has been appointed to organize a new service in the company to be called the New Industries Department which will have for its purpose the encouragement of commercial development in the sections of Southern Oregon and Northern California served by the lines of the company. Before coming to the Pacific Coast in 1902, Mr. Crawford spent two years in the Orient with the general importing firm of Frazar & Company in Yokohama and several years in the Atlantic Coast selling railway appliances. For thirteen years he was with Charles C. Moore & Company, engineers of San Francisco, as sales engineer and manager of the Portland district office. During the next two years he was sales manager for the Simmen Automatic Railway Signal Company, of New York, traveling over the United States in the interests of railroad block signal applications. He then returned to Portland to take over the management of the Department of Industries of the Portland Chamber of Commerce which has received his entire time for the past six years. Mr. Crawford, in his new work will make an industrial survey of the territory served by The Califor-



WM. H. CRAWFORD

nia Oregon Power Company and will furnish accurate information and data on the economic possibilities of the field to concerns who might be interested or induced to establish industries here. The department will work in close harmony with the chambers of commerce in the territory.

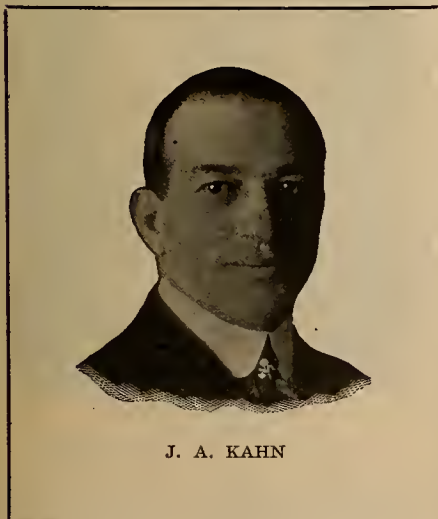
W. C. Smith, transformer specialist for the Pacific Coast for the General Electric Company, delivered an illustrated lecture on the subject of "The Electric Transformer" before the April meeting of the San Francisco Section of the American Institute of Electrical Engineers. The same lecture was given before the Los Angeles Section of the Institute on March 27, 1923.

J. B. Barnhill of the firm of Evans & Barnhill, San Francisco, spoke before a recent meeting of the Oakland Electric Club on the subject of "Value of Advertising to Retail Trade."

George B. Cook, of the American Cross Arm & Conduit Company of New York, is in Los Angeles going over the business field in this section in the interests of his company.

Frank L. Ostler has been appointed secretary of the Public Utilities Commission of Utah, to succeed T. E. Banning, who resigned last February. Mr. Ostler has had considerable experience in rate work, having entered the rate department of the Oregon Short Line Railroad at Salt Lake City in 1907. Ten years later he was transferred to the accounting department of that railroad. In April, 1921, he accepted a position as deputy in the office of the state auditor of Utah, and was later placed in charge of auditing accounts in the various departments and state institutions.

Jacob A. Kahn, president of the Capital Electric Company, Salt Lake City jobbers, has been made president of the newly organized Utah Builders' Exchange, an organization formed for the promotion of the building industry in Utah. Mr. Kahn is one of the most active figures in the electrical industry in the Intermountain district. He took a prominent part in the organization of the Rocky Mountain Electrical Cooperative League and served as president of the advisory committee of that organization during 1921. He is also active in the affairs of the Pacific Coast Division of the National Electrical Sup-



J. A. KAHN

ply Jobbers' Association. Mr. Kahn became connected with the Capital Electric Company, one of the largest jobbing houses in the Intermountain district, in 1918 as vice-president and treasurer. Later he held the position of vice-president and general manager and more recently the office of president.

Durbin Van Law, well known electrical engineer of Denver, Colo., who is managing the mountain district of the United States Veterans Bureau, addressed the Real Estate Exchange in that city March 14.

W. B. Lewis, formerly in the sales department of the San Francisco office of the Western Electric Company, is now in the Los Angeles office of that organization. Mr. Lewis has had considerable electrical experience and formerly had charge of the San Joaquin territory.

F. R. Smith, formerly representative of the Wise-McClung Manufacturing Company in the mountain region, has assumed charge of the catalog department of the Hendrie & Bolthoff Manufacturing Company in Denver, Colo.

Frank A. Easton, formerly head of the gas department of the San Joaquin Light & Power Corporation at Bakersfield, has been transferred to the head offices of the company at Fresno where he will have charge of the sale of the company's securities as stock sales manager.

Warren Stoutnor, a member of the Public Utilities Commission of Utah, has been appointed by the president of the National Association of Railway and Utilities Commissioners as a member of the special committee on telephone depreciation which meets in Washington May 1. Insofar as Utah is concerned, the commission is enjoined by the Federal court from interfering with the rules and regulations as prescribed by the Interstate Commerce Commission, and this hearing which Commissioner Stoutnor will attend is to adopt new rules for accounting and depreciation.

F. F. Winfree, electrical engineer at the head offices of the Mountain States Power Company, has assumed control of the Eugene office. He takes the place temporarily of Fred Brown, who leaves for Tacoma, Wash. Mr. Winfree is in charge of the new business of the company in Albany. He will be stationed in Eugene only until a resident engineer can be employed to take charge of the company's properties in Lane County.

D. W. Davis, former governor of Idaho and now special assistant secretary of the interior, accompanied by A. P. Davis, director of the reclamation service, will enter the Pacific Northwest on a tour of investigation of reclamation projects at Klamath Falls, Ore., May 1. From there they will go to Portland, thence to Hermiston, Ore., to examine the Umatilla project. After inspection of the Columbia Basin irrigation project they will go to Boise, Idaho.

E. R. Crocker, for 15 years reclamation service engineer and for the last three years stationed at Hermiston project in west Umatilla county, has been selected to conduct the survey of the Umatilla rapids project, and will start preliminary work, planning to get into full swing during the low waters of summer. It is not known over what period of time the survey will extend, but the \$50,000 appropriation by the government for the work is not expected to carry out the complete program.

G. C. LaMarsna of the Taft Electric Company, Taft, Calif., was a recent Los Angeles visitor.

N. Nanassy of Catton Neill & Company, Inc., Honolulu, recently visited Los Angeles.

August J. Lutz, Oakland district manager of the Pacific States Electric Company, has been elected president of the Oakland Electric Club for the coming year. Mr. Lutz entered the electrical industry at the age of 14 as errand boy at the California Electric Works, the fore-runner of the Western Electric Company in San Francisco. He held various positions with this company until in 1905 he was placed in charge of the billing department. He left this company to join the John M. Klein Company. After the San Francisco fire



A. J. LUTZ

in 1906 he took charge of the stock department of the Century Klein Electric Company, leaving in 1908 to become a salesman for the Sterling Electric Company, the predecessor of the Pacific States Electric Company. He remained on the road for the latter firm until September, 1922, when he was appointed district manager of the Oakland office. Mr. Lutz has been very active in the affairs of the Oakland Electric Club and the organization is looking forward to a promising year under his leadership.

J. Jerome Canavan, Pacific Coast distributor for Walker electric trucks, was the principal speaker at a recent weekly luncheon of the Seattle Electric Club, speaking on the subject of "Electric Trucks in Industry."

Obituary

Charles Preston Burgess, general manager of the Pacific Coast Steel Company and president of the Steel Mill Foundry & Supply Company, died in San Francisco on April 14, 1923. Mr. Burgess was well known as a leader in the iron and steel industry of the Pacific Coast. He was born in Birmingham, Ala., 48 years ago. He was formerly general superintendent of the western plants of the Republic Iron & Steel Company, with headquarters in Chicago. In 1914 he became general manager of the St. Louis Screw Company, remaining with that firm until 1916 when he joined the Pacific Coast Steel Company as manager of its Seattle office. He came to San Francisco as general manager of the company in 1919.

Manufacturer, Dealer and Jobber Activities

The Square D Company, Detroit, Mich., has recently perfected a new industrial safety switch, which is described in Bulletin No. 30. The new switch embodies several new and distinctive features including unit bases of moulded composition for each jaw and fuse clip instead of the old slate base. Porcelain protective covers enclose each line terminal so that even when the switch cover is open, no live parts are exposed. These protective covers can easily be attached or removed at will.

The Condit Electrical Manufacturing Company, South Boston, Mass., has just issued Bulletin No. 417-2 describing its protective relays and accessories for electrically operated switchgear. The bulletin describes the various types of relays manufactured by the company as well as control switches, instantaneous control relays, hesitating control relays, lockout relays and undervoltage relays. It also contains wiring diagrams for various setups of electrically operated switchgear.

The Electric Shop of Lusk, Wyo., has been purchased by Lyle Berry who plans to move the establishment to a more advantageous location on the main business street of the town. The shop was formerly owned by Neal C. Rowell.

The American Spiral Pipe Works, Chicago, manufacturers of Taylor's spiral riveted steel pipe, has recently issued a new catalog describing its products. The pipe is extensively used on high pressure hydroelectric installations and many such installations are photographically featured in the catalog. Several pages have also been devoted to an excellent collection of hydraulic tables and charts.

The Ivanhoe-Regent Works of the General Electric Works has recently published a sixteen-page illustrated booklet entitled "Lighting Recipes for Every Room in the Home." The booklet, which is printed in color, depicts the various uses of decorative glassware for home lighting. It is designed for distribution to the consumer with the idea of creating a desire for better lighting in the home. It is one of the most attractive pieces of sales literature to be published by the lighting industry.

The Seattle office of the Electric Storage Battery Company will begin the making of Exide batteries for the Northwest district in the near future, George D. Luther, Seattle manager, announces.

The Walker Electric Truck Company has established offices in Portland at 216 United States Bank Building, with L. L. Morgan as district manager. The new offices were established as the result of a visit to the Northwest by J. J. Canavan, Pacific Coast distributor for the truck. One of the first orders received at the new office was from the Log Cabin Baking Company of Portland for 9 electric trucks.

M. R. Price, proprietor of the Reliable Electric Company, has taken over the East Denver Electric Company at 2720 Larimer St.

The Westinghouse Electric & Manufacturing Company has moved its Portland offices from the Northwestern Bank Building to the new Porter Building at Fifth and Oak Sts. The change was necessitated by the increase in the volume of business and the enlarged sales staff of the office.

The Pacific Electric Manufacturing Company, San Francisco, has leased additional floor space of approximately 15,000 sq. ft. in a building adjoining its present headquarters. The new space will enable the company to increase its manufacturing facilities so as to adequately care for the large volume of new business which it is receiving.

Schweitzer & Conrad, Inc., Chicago, manufacturers of high voltage protective and switching equipment, have recently published Bulletin No. 203, describing the outdoor bus supports manufactured by that company.

The Ross Electric Appliance Company, Inc., Seattle, has been incorporated for \$100,000, with A. E. Ross, G. E. Ross and F. L. Kerzie incorporators.

George D. Engle, Los Angeles representative of the National Conduit & Cable Company, recently reported the sale of 50,000 ft. of trolley wire to the Los Angeles Railway Company.

A new electrical shop, specializing in lighting fixtures, has been opened in Denver by the Sullivan & Gunther Electrical Company at 559 East Colfax Avenue.

The Baker Electric Company, one of the Thor dealers in Denver and formerly located in the Royal Market in that city, has moved to larger quarters at 34 Broadway.

The latest addition to the ranks of the manufacturers' agents in Denver is the Ormor Sales and Supply Company, recently organized by C. W. Orr and W. H. Moore. Several lines of electrical supplies and machinery will be handled.

R. G. Nathan, formerly one of the members of the Crooks-Nathan Household Appliance Company of Denver, has organized the Nathan Appliance Company with offices at 305 Commonwealth Building in that city. The complete line of washing machines and equipment produced by the Voss Bros. Manufacturing Company of Davenport, Iowa, will be featured.

The electric cooking school recently conducted in Pueblo, Colo., by the Edison Electric Appliance Company in conjunction with the Southern Colorado Power Company and one of the local newspapers has proven very productive, judging from the sales reports of Hotpoint-Hughes automatic ranges placed by A. R. Wooley and Jack Pheester. A follow-up campaign is now being staged by the Westinghouse Company through its merchandising specialist, M. E. Lanning. As soon as electric cookery has been introduced in Pueblo, similar campaigns will be featured in other towns of the Arkansas Valley served by the Southern Colorado Power Company.

Lighting fixtures and parts manufactured by the Art Metal Spinning Works were recently displayed in the windows of the Denver Gas & Electric Light Company. A new department has been established in the former company by Harry Smith, the manager, for the production of a popular priced line of luminaires.

The Sharpe Electrical Appliance Company has been incorporated in Denver by Elvin C. Sharpe, Bertha A. Harris, and W. C. Danks, and a new retail store has been opened at 1735 California St. Industrial heating equipment and electric smelting furnaces also are manufactured and sold by the company.

E. A. Van Gundy, J. J. Swords, and W. S. Townsend of Denver have incorporated the Fjord Washing Machine Company and will shortly place this product, a portable washing machine, on the market.

C. H. Kurz has been appointed to succeed Dyer Thomas as the manager of the Federal Electric Company in Denver, the latter having been transferred to Detroit as sales manager of the company at that place. New quarters have been established for the Denver office at 1073 Broadway.

The P. A. Geier Company, in a new booklet on the Royal Vibrator, emphasizes the all-around usefulness of electric massage. This manufacturer points out that the trade in general hardly appreciates the fact that the vibrator has a wide field of usefulness, in the home as well as in the beauty parlor, the doctor's office, the barber shop, clubs, and gymnasiums.



INTRODUCING
MISS MILDRED DE LONG

Some time ago we instituted a fishing contest in this column which was productive of much entertainment and several good pictures. Emboldened by the success of this contest, our Denver correspondent has suggested that we run a beauty contest of eye-pleasing damsels within the electrical industry. As evidence of his good faith he has submitted the above photograph and dared us to run it. Miss De Long represented the Denver Gas & Electric Light Company in the princess revue, featured at the recent industrial exposition of the Colorado Manufacturers' Association. Our correspondent informs us confidentially that "she is one good-looker—the queen of the belles in the central station and very popular"; also that he was married.

Trade Outlook

Salt Lake City

General improvement in business conditions is in evidence in practically all parts of the Intermountain territory.

An accurate index of the favorable condition of the metal mining industry is the activity of the large machinery companies of Salt Lake City. Large increases in business are reported by all of such firms. Up to May 1 \$2,500,000 in dividends had been paid by metal mining companies in the state of Utah so far this year, and the grand total of disbursements has reached more than \$237,000,000.

Considerable road-building work is outlined for this year, some of which has already begun. The Union Pacific Railroad will pursue an aggressive course this summer in the construction of feeder lines throughout Utah and Idaho, and the Denver & Rio Grande contemplates spending not less than \$1,000,000 in improving its shops and roundhouse in Salt Lake City.

Electrical jobbers report business in a much healthier condition than last year, with prospects for the remainder of this year exceedingly good. Electrical retailers are pushing seasonal merchandise with fairly good results. Contractors are securing considerable business on account of new home-building. Wholesale and retail trade, in general, in Salt Lake City and surrounding territory continues to show a marked improvement. Another very encouraging feature is the decided improvement in collections and credit conditions.

Seattle

With 20 per cent of the mills in the Northwest operating on a two-shift basis, and logging camps turning out capacity production to meet the demand for logs, the lumber industry in the Pacific Northwest is in good condition. Demands for lumber from the Atlantic Coast, the export trade, middle west and California continue so heavy that many large plants are devoting their output entirely to supplying this need, and claim they can make as satisfactory profits as on local business. Building activities in the Puget Sound country are such as to create a wide demand for lumber products, while cargo business from all the cargo plants is exceptionally heavy.

Building activities in Seattle promise to be heavy during the spring and summer months, with plenty of money available at reasonable rates to provide for industrial and residence building. The real estate market is strengthening noticeably, and real estate is showing an advance in price.

Electrical business in Seattle is going ahead in stronger volume than for any year since 1918, according to reports of large supply houses, and volume of sales so far indicate that 1923 will compare favorably with the largest war-year's business. A movement toward stiffening in prices of certain goods is apparent. There exists a good demand

for large equipment, such as is required by lumber mills and large industrial plants, including generators, turbines, and large transformers required in the industrial and lumber districts.

Los Angeles

A wonderful record for building operations was rolled up by the Pacific Southwest during March, 1923. Thirty-nine cities, including Los Angeles, reported permits issued for the month with a total estimated valuation of \$33,785,413, as compared with \$18,495,096 for March, 1922. Thirty-eight cities outside Los Angeles report a total of \$12,591,326 for March as compared with \$7,530,829 for the same month in 1922.

For the first quarter of 1923 the enormous total of \$76,471,945 has been reported in the Pacific Southwest by 36 cities in January, 38 cities in February and 39 cities in March. This total, which includes Los Angeles, is 72 per cent greater than that for the first quarter of 1922. The total for all cities outside Los Angeles for the first quarter of 1923 is \$31,937,031, which is a gain of 78 per cent compared with the total for the corresponding period last year.

Growth of bank clearings in Los Angeles is clearly shown by an increase in a five-day period of April, 1923, over the corresponding period in 1922. In the 1922 period the clearings were \$75,983,572.69, while those for the same period in 1923 amounted to \$127,005,279.99, or an increase of approximately \$51,000,000, a gain of nearly 70 per cent.

Wholesale business remains good, particularly in the supply line, while manufacturers report large sales and excellent business. For the first half of April, electrical dealers report a slight reduction in business over the previous month, while radio sales have also fallen off to a small extent, but on the whole the outlook is extremely encouraging and business is far and away ahead of the same period last year.

Denver

Although business continues to prosper, there is an occasional precautionary note heard from the agricultural districts where the financial problems of the farmer have not as yet been satisfactorily solved. Credits have been improved in the rural sections but collections are slow. There is little new building being undertaken outside of the commercial and industrial centers and to these latter communities the boom of the past year is principally due.

Central stations are proving good customers but industrial concerns are leading in the placement of electrical orders at this time. Negligible reserve stocks are being purchased because of uncertain prices. All forms of equipment containing copper, with the exception of switches, have jumped rapidly in price and even further increases are anticipated before any reaction will

manifest itself in this part of the country.

There is plenty of work for everybody. Skilled building craftsmen are commanding wartime peak wages and the supply of ordinary labor is low. Considerable trouble is anticipated for the crop season in securing the necessary hands. Government investigations indicate a "healthy and robust" employment condition.

Electric ranges are moving well in some parts of the state and there is a steady demand for appliances. Special campaigns are being featured in nearly all the larger cities. Radio is solidly holding its own.

San Francisco

The building industry continues very active, and the orders being placed for lumber exceed production by from 25 to 40 per cent. Construction activities are mainly in the form of new industrial establishments, hotels, apartments, office buildings and a steady stream of moderately priced residences. Materials are high with shortages in some commodities. Electrical contractors report an increasing amount of business each month.

Dealers' business is better with a steady movement in larger household appliances. Considerable stimulus has been added to the radio industry by a Radio and Electrical Exposition held during the past month. Electrical dealers also report a favorable reaction from this event.

Plans are being formulated for an active appliance campaign early in June, when the California Electrical Co-operative Campaign will conduct the second annual June Bride Week. Many dealers disposed of large quantities of household and table appliances during a similar campaign last year. A second electrical home will be opened to the public early in May and its showing is expected to have a favorable reaction for both contractors and dealers.

Portland

The lumber industry, which forms the backbone of the industries of the Northwest, is experiencing a tremendous activity. Many mills are running 16 hours, and a few 24 hours. During the week ending April 14, the production at the mills was 25 per cent above normal, new business equal to production and shipments 5 per cent above new business. With such a situation it is evident that stocks are not accumulating. About 40 per cent is moving by water to the Orient, Australia, California and Atlantic ports.

Building construction continues at a high rate, though there have been increases in the cost of both labor and materials. Office and retail store space in Portland is becoming hard to find and a large amount of downtown building is in progress.

Conditions outside of the cities are not prosperous, and as a consequence the stock raiser and farmer are not buying actively. Weather conditions have favored spring planting.

Electrical jobbers report stocks in fair shape, with the exception of conduit. Sales of ranges, cleaners and washers are good. Prices are firm. Collections are said to be slightly poorer.

Construction News

Bridges

Ore., Oregon City—Tobin & Pierce, bridge contractors of Portland, have been awarded the contract for the erection of the Pudding River bridge near Aurora on their bid of \$75,545.

Ore., Hood River—Construction of an interstate bridge across the Columbia River, connecting Hood River and White Salmon, will begin immediately after the June freshet this year. Bonds to the amount of \$300,000 have been underwritten and of the preferred stock of \$175,000, \$75,000 will be taken by local capital. The new bridge will be an important link in the highway between Oregon and eastern Washington. A road connecting Glenwood, in the northern part of Klickitat County, is under construction. It will bring Yakima 70 miles closer to the Columbia River highway. Leslie Butler, chairman of the board of the Butler Banking Company, has been named chairman of the board of the new bridge committee, and E. O. Blanchar, president of the First National Bank, will be the county's other director. Victor A. Johnson of Portland, is general agent of the new corporation.

Ore., Salem—Contract for bridge over the Klamath River near Spencers, on the Ashland-Klamath Falls highway in Klamath County, has been awarded at a cost of \$41,510 to the Union Bridge Company of Portland.

Utah, Salt Lake City—The state road commission recently awarded to the Security Bridge Company contract for the erection of a bridge at Wildside, Carbon County, on the main state highway eastward by way of Price and Green River to the Colorado line. The bridge will have a 100-ft. span, will be of steel on cement rubble masonry, with abutments on piling and the approaches surfaced with gravel. The Security Company was the lowest of eight bidders, the figure being \$31,753.67, including about \$10,000 worth of materials furnished by the state, and 10 per cent additional for engineering, inspection and contingent charges. The engineers' estimate corresponding was \$38,679.60, which was exceeded by two of the bids.

Wash., Kelso—Contract for construction of 2,200 ft. of trestle approaches to the proposed Cowlitz bridge, has been let to Hart Construction Company, Tacoma. Bridge will be of steel, 800 ft. long.

Wash., Everett—Snohomish county commissioners, Ross D. Alverson, county engineer, will erect a steel bridge across Stillaguamish River near Haller, to cost \$35,000.

Wash., Olympia—The state highway department will receive bids until July 31 for the La Center bridge, over the south fork of the Lewis River, near Woodland. The structure will be 1,400 ft. long, of reinforced concrete construction, and will consist of one main arch over the distance across the river, while the remainder will be of short spans. A roadway 20 ft. wide is provided, with 4-ft. sidewalks on both sides. Structure will cost \$100,000 and be built under the supervision of R. M. Gillis, district highway engineer, requiring one year for its completion.

Buildings (Industrial)

Calif., Orland—Plans for the establishment of a lumber yard, box factory and planing mill here are being completed by W. T. Hilliard, of Paskenta.

Calif., San Francisco—A. J. Rickey and W. F. Schimpfman are planning the erection of a class C building to be used as a laundry, on

the north side of 14th Street, west of Howard, to cost \$38,550.

Calif., San Francisco—Hale Bros., Inc., have prepared plans for an 8-story warehouse on the south side of Stevenson Street, west of Fifth, to cost \$40,000.

Calif., Oakland—Capitalized at \$100,000 with shares at \$10 each, the Cox Cylinder Works has filed articles of incorporation. The directors are H. C. Cox, R. B. Ryan and Fred Wettstein. The company plans to have a cylinder plant in Oakland.

Calif., Los Angeles—The California Cyanide Company is planning to erect a \$1,100,000 factory near Cudahy City. Engineers of the Air Reduction Company will draw plans. Work will start at once.

Calif., Santa Monica—Haley Bros. are planning to erect a \$100,000 factory on Colorado and 14th Sts. This company will manufacture sashes, doors and flooring.

Colo., Denver—Stenmark & Peterson, general contractors, have been awarded the contract for constructing a 3-story concrete public garage at 1828 California Street, in the downtown section, at a figure close to \$75,000.

Utah, Salt Lake City—The Linde Air Products Co.-Pacific Coast is planning the erection of a factory in Salt Lake City, work to commence the coming summer. The total investment, including site, building and equipment will be more than \$500,000. This company manufactures oxygen and other products of air, used chiefly for welding, cutting and similar purposes.

Wash., White Salmon—The White Salmon Box & Lumber Company at Bingen has started erection of a second factory to care for the heavy orders this season. The new structure will be 175 x 50 ft. The plant will be electrically driven and will employ two shifts.

Wash., Seattle—The Federal Pipe & Tank Company has completed plans for a factory for the manufacture of wooden tanks and wood stave pipe, in Seattle. Structure will be 150 x 72 ft. in size, completely equipped.

Wash., Spokane—Inland Empire Paper Company has under way extensive improvements to its plant, to cost \$100,000. Work includes development of office protection equipment and yard trackage, and construction of ten modern homes for its employees.

Wash., Spokane—The Spokane Refinery Company, organized with capital of \$200,000, plans erection of oil refinery with daily capacity of from 500 to 1,000 bbl. of crude oil. J. P. Graves, Spokane, heads the project.

Wash., Bellingham—The Western Woodwork Company has begun work on a new plant to cost \$25,000, to manufacture sash and door products.

Wash., Tacoma—The Tacoma Gas & Fuel Company will start within 30 days erection of a plant to cost \$250,000, and to have daily capacity of 5,000,000 cu. ft. Two buildings, one 80 x 100 ft. and the other 30 x 80 ft., are included in plans.

Wash., White Salmon—The White Salmon Box & Lumber Company will erect a second factory, to be 175 x 50 ft., electrically driven throughout.

Wash., Tacoma—The Tacoma Lumber Company will construct a lumber manufacturing plant here, with daily capacity of 70,000 ft. Welles Wheeler heads the company. The Western Lumber Manufacturing Company, Tacoma, will also erect a lumber mill with daily capacity of 100,000 ft.

Wash., Seattle—Henry Disston & Sons, Inc., has leased a site 120 x 150 ft., on which will be erected a factory and warehouse costing \$60,000, providing employment for 150 men. With the completed plant, Seattle becomes the Pacific Coast headquarters of the Disston Company. Local plant will specialize in manufacture of planer knives, made by special process.

Dams

Calif., Oroville—Contract for the construction of the Lost Creek dam of the Oroville-Wyandotte Irrigation District has been awarded to Lord & Thomas, Montana contractors, on a bid of \$58,761. The dam was designed by L. Jorgensen of San Francisco.

Highways

Ore., Eugene—Work will be resumed at once on the big project of building a highway over the Cascade Mountains by way of the McKenzie Pass, according to the announcement by the engineers of the United States Bureau of Public Roads. The government has about 20 miles of the highway to build to complete the project which was started three years ago. The total estimated cost will be about \$1,000,000. Eight construction camps will be established at once and 200 men will be employed.

Ore., Portland—Contracts have been awarded by the state highway commission as follows: Dairy Creek Fill, Washington County, to Otto Brose of Hillsboro, \$21,750; .024 miles embankment construction. Cow Canyon section of the Dalles-California highway in Wasco County, 7.72 miles broken stone surfacing, to Montague-O'Reilly Co. of Portland for \$38,458. Hillsboro-Forest Grove section of Tualatin highway in Washington County, bridge over Dairy Creek near Hillsboro, to W. D. Hoffman of Amity for \$28,720. McKay creek-Pilot Rock section of Oregon-Washington highway in Umatilla County, bridge No. 995 over McKay creek to the Union Bridge Company of Portland, for \$24,546. Lewis and Clarke bascule bridge—the bid of the Pacific Bridge Company was satisfactory but was referred to the highway engineer for settlement of the control systems. The bid was for \$170,835.

Ore., Astoria—The Clatsop County Court has awarded contracts to McLean & Williams of Astoria for paving one mile of the market road and five miles of the main Nehalem highway for a total of \$135,603. The pavements will be of concrete, 6½ in. in thickness, and are to be completed by Oct. 1.

Ore., St. Helens—The St. Helens-Pittsburg Market road is to be completed at a cost of \$40,000, according to Roadmaster Ellerton. This road will connect St. Helens with Nehalem with a 16-ft. road and the maximum grade will be 5 per cent.

Ore., Imbler—Work on the \$50,000 viaduct between Imbler and Elgin is to be completed by May 1. A 12-ft. cut is required for about a quarter of a mile. New rock crushers are being filled up at Rhinhart to furnish roadbed material needed to complete the highway.

Wash., Olympia—The McHugh Construction Company, Seattle, on a bid of \$147,559.88, received contract for paving 4.71 miles of Pacific Highway, from Castle Rock to Laughlins, in Cowlitz County. Contract for grading and paving of 5.53 miles of Pacific Highway, from Laughlins to Neals, Cowlitz County, has been let to McHugh Construction Company, Seattle, on a bid of \$180,111.05.

Wash., Seattle—King County Commissioners have revised their plans for the Dockton-Molita road on Maury Island, and new plans provide for constructing the Hill road, at a cost of \$30,000.

Irrigation

Wash., Wenatchee—The Riverside Irrigation District has been formed, bonds voted and a satisfactory offer made for the bonds, which means that the 4,000 acres above Riverside will come under water next year. F. B. Brock, secretary of the project.

Wash., Centralia—Excavation of approximately 200,000 cu. yd. of earth is involved in a contract upon which bids are to be taken immediately by Commissioners of Drainage and Diking, District No. 1, Lewis and Thurston Counties. About 4,000 acres of land will be drained near Centralia. Guy Smith, Centralia, secretary of the district.

Wash., Mt. Vernon—Petition for a drainage district in the Padulla Bay district, from Samish Point to Hat Island, and from Hat Island on the mainland north to Indian Slough, has been granted by Skagit County Commissioners. Nearly 9,000 acres of tideflats will be reclaimed, costing \$1,000,000. Plans provide a main enclosing dike of an average height of 20 ft., dike to be seven miles long by 20 ft. wide at the top and 100 ft. at the bottom. Project will involve a year's work, and was petitioned for by 273 residents of district.

Power Plant Equipment

Colo., Denver—A permit has been taken out by the Denver Tramway Co. for the construction and equipment of a new substation at 3555 Gilpin St., near the east side car barns.

Eugene, Ore.—Plans are being made by Ellis F. Lawrence, dean of the School of Architecture, for a new power house to cost \$75,000 which will replace the one condemned by the state fire marshal. The plant is expected to be ready for use with the beginning of the fall quarter of the University of Oregon.

Ore., Baker—The Eastern Oregon Light & Power Company is to spend \$100,000 in 1923, according to Manager J. P. Lottridge, who has been in Milwaukee in conference with the directors of the company. A large steam plant is to be built in Baker, having a capacity of 1,500 hp. The plant is to be completed by Oct. 1.

Logan, Utah—The city of Logan is to hold a special election on May 15 for the purpose of submitting to the qualified voters the question of incurring a bonded indebtedness of \$300,000 with which to rebuild its municipal power plant in Logan canyon.

Wash., Tacoma—The city light's annual requirements in distribution transformers provide for an expenditure of \$75,000, including purchase of 180 oil-immersed, self-cooled transformers, ranging in size from 25 to 333 kw.

Wash., Seattle—The Board of Public Works has awarded to W. R. Hendry Company, Hoge Building, on their bid of \$121,679.08, contract for furnishing transformers for the municipal light department.

Power Projects

Calif., Visalia—The 1923 budget of the Southern California Edison Company is approximately \$1,000,000, according to recent announcement by R. I. Carruthers, district manager. About half of this amount will be spent in the Visalia district proper, while the remainder will be used in the High Sierra east of Visalia on transmission construction. The Visalia budget includes \$220,000 for the new Venida substation, \$100,000 for a new substation in Kings County, \$20,000 for a store in Visalia, \$122,000 for line extensions and \$30,500 on renewals.

Wash., Seattle—Contract for construction of the transmission line to bring Skagit current to Seattle was awarded to the NePage-McKenney Co., on a bid of \$268,000.

Wash., Ridgefield—The contract for the construction of the high power line to be built by the Clarke County Water, Light & Power Com-

pany was awarded to the George Burdick Company of Portland. The company is to supply light, power and water to Orchards, Brush Prairie and Battle Ground. Construction must be done by Sept. 1.

Wash., Spokane—Issuance of a permanent Federal license for the development of the Kettle Falls hydroelectric project by the Washington Water Power Company is expected shortly after the preliminary survey work is completed about May 15, according to D. L. Huntington, president. The work on the dam and power house at Kettle Falls will start immediately after the Federal license is issued. The first step will be the construction of several miles of railway from the main line to the power site, and it is estimated that the first unit will take two years to build, and should be in operation in the summer of 1925.

Wash., Olympia—Application has been received from Sterling B. Hill for permit to divert 1,000 sec.-ft. of water from the south fork of the Nooksack River and to construct a 32,000-hp. hydroelectric plant. Project would cost \$2,000,000.

Wash., Everett—Puget Sound Light & Power Company on April 16 began work on the power line extension between Hartford and Granite Falls, completion of which will enable the company to abandon the hydroelectric plant on Pilchuck Creek.

Wash., Kelso—The Long-Bell Lumber Company has awarded to the Charles C. Moore Company of San Francisco, contract for construction of the company's large power plant, which will supply power to the mills, the city of Longview and logging camp, and will have an ultimate development of 20,000 hp. Work will cost about \$2,000,000.

Wash., Spokane—The Grangeville Light & Power Co., with general offices in Spokane, has completed its preliminary surveys for a new power plant at Brucet's eddy on the north fork of the Clearwater River, four miles from Orofino, Idaho. Two power sites are being considered, an upper and a lower, about $\frac{3}{4}$ -mile apart. J. Wood, engineer of Spokane, is in charge of field investigations.

Railways

Mont., Great Falls—Contract for shop construction work, involving an expenditure of more than \$50,000, has been let by the Great Northern to Pappin & Son of this city. The contract includes the remodeling of the local car repair shop and the construction of a new wood mill. According to Engineer E. E. Adams, this \$50,000 is but a part of \$1,500,000 which the Great Northern is spending in Montana this year. Improvements include double tracking on the main line and the construction of a considerable number of new bridges and culverts at various points.

Ore., Marshfield—A logging railroad, costing \$40,000, is to be built by the Western White Cedar Company connecting the south fork of the Coquille and up Dement Creek. The company will tap about 60 million feet of timber.

Ore., Portland—\$40,000 is being expended by the Portland Railway, Light & Power Company in constructing rails on Hawthorne Avenue from Grand Avenue to East 11th Street, as announced by F. I. Fuller, vice-president of the company.

Wash., Spokane—Fred Herrich, lumberman and timber operator, will begin the opening of the timber district in the Malheur National Forest. The cost of building a railroad into the project and equipping it with locomotives and rolling stock will run slightly in excess of \$1,000,000. The railroad will run from Burns, Ore., to Crane and Seneca, Ore., adjacent to the timber area purchased. The sawmill investment needed, exclusive of a possible box factory and dwellings, has been estimated at \$525,000.

Wash., Kelso—Contract for grading 30 miles of railway from Longview to a point west of Vader for the Longview, Portland & Northern Railway has been let to Twohy Brothers of Seattle and Portland, the contract price exceeding \$1,000,000.

Streets and Sewers

Calif., Yuba City—The Latourette-Fical Company and Michael Murphy, of Sacramento, were successful bidders on the first step in the construction of a sanitary sewer system. The Latourette-Fical Co. bid on the sewage reservoir and superstructure was \$13,112. Mr. Murphy will lay the 12, 14 and 16-in. sewer pipes from Sumner to B Street, including the manholes, for \$15,770. Figures on the balance of sewer pipe and other equipment were rejected as the bids were considered too high. New bids will be called for to be opened May 7.

Calif., Chico—The Chico Contracting Co. has been awarded a paving contract involving \$232,000, by the city trustees.

Calif., Hanford—A paving contract for seven blocks of asphalt pavement on Ivy Street from Brown to Park Ave. was awarded recently by the city trustees to the California Construction Co. of Fresno, in the sum of \$40,000.

Ore., Portland—Three street improvement contracts are as follows: Improvement of Tibbetts Street from East 19th St. to a point 300 ft. east to the Municipal Paving Plant, \$1,844; improvement of Simpson Street, Union Avenue to East 9th St., to A. D. Kern for \$8,283; district improvement of East 10th, East 9th, East 21st, East 22nd and East 33rd, Regents Drive and Ridgwood Avenue to A. D. Kern for \$35,383.

Ore., Corvallis—Bonds in the amount of \$50,000 have been voted by the city council for the extension of the Fillmore Street sewer westward to the city limits.

Wash., Centralia—Contracts for paving approximately 34 blocks of city streets have been awarded to R. G. Stevenson, 1327 North 34th Street, Seattle, on his bid of \$102,640—\$1.99 per sq. yd. of concrete surface. The Albers Brothers Construction Company gets award of contract amounting to \$14,520, involving 5,000 yd. of paving.

Wash., Tacoma—Cost of resurfacing Yakima Avenue, from Division to Steele Streets, with concrete curbs, is placed at \$40,000. Work will proceed shortly.

Wash., Kelso—City clerk will receive bids until May 8 for grading, paving, and sidewalks in L. I. D. No. 45, the work including 9,842 cu. yd. of excavation, 9,922 lin. ft. of concrete curbs, 33,150 sq. yd. of concrete sidewalks; 14,069 sq. yd. of pavement.

Wash., Seattle—Paving of Jackson Street and adjoining streets and avenues south of Yesler Way, between First and Fourth Avenues, has been recommended by the streets and sewers committee, the work to cost approximately \$500,000. The paving of Wilson Avenue and Genessee Street in Rainier Valley is also recommended, the cost of this work being \$250,000. Ordinance will be introduced at once calling for both of above projects.

Wash., Kelso—Contracts for sewer and water system installations in Longview have been awarded as follows: Bardsen & Company of Butte, Mont., installation of the sanitary sewer system. J. D. Hanley of Portland obtained the contract for the storm sewer installation. James Payne, who is installing the sewer and water systems in the industrial area of Longview, obtained the contract for the water system installation. The contracts total \$200,000, the Long-Bell Company supplying all material.

Wash., Seattle—Low bid submitted for concrete walks on Atlantic Street was that of Paduano & Crisman, who bid \$31,532. Work involves 17,300 sq. yd. of concrete walks. Low bid for paving Findlay Street, estimated to cost

\$37,000, was submitted by Coluccio & Erickson, at \$43,030, the lowest of seven bids. Work involves 4,000 cu. yd. of grading, and 14,225 sq. yd. of 6-in. concrete paving. Contract for grading, et al. in Brandon Street, has been let to George A. Banderet, for \$36,554. Work involves 24,700 cu. yd. of grading. Contract for grading and paving 9th Avenue South, et al., part of the Beacon Hill regrade project, has been let to Puget Sound Bridge & Dredging Company, on their bid of \$494,968. This work involved 750,000 cu. yd. of excavation, 7,000 ft. concrete curb, and 23,050 sq. yd. of 8-in. concrete paving. Contract for grading the Golf Heights city property, part of the Beacon Hill regrade project, has been awarded to the Puget Sound Bridge & Dredging Company, on a bid of \$74,464. This work involves 646,000 cu. yd. of excavation. All bids for the proposed tunnel under First Avenue South, estimated by the city engineer to cost \$80,000, have been rejected. Lowest bid submitted was that of J. A. McEachern, Colman Building, \$123,665. New bids will be called. Sewers to cost \$121,227 are planned for 30th Avenue South, et al., by the Board of Public Works. Estimated cost of grading and paving of First Avenue South, proposed, is placed at \$125,447.

Waterworks

Calif., Chico—The proposition to vote a \$475,000 bond issue to acquire three privately owned water systems here and for the amalgamation and enlargement of these systems as a municipal water supply was defeated by the voters at an election on April 9.

Calif., Long Beach—City council has authorized the expenditure of \$100,000 to enlarge the city's water system. Work will include the drilling of two additional wells on the city's water lands, reservoir construction, and the laying of additional mains to East Long Beach, North Long Beach and Belmont Shore; 8,000 ft. of 10-in. pipe will be laid at a cost of \$24,000; 6,000 ft. of 8-in. pipe will be laid at a cost of \$16,000. The Western Reinforced Concrete Pipe Company was awarded contract for furnishing 5,001 ft. of 30-water pipe for the water department, at a cost of \$13,002.60.

Ore., Astoria—The water system, which was recently destroyed in the great fire, is to be restored at a cost of between \$37,000 and \$40,000. O. A. Kratz is city manager in charge.

Wash., Everett—T. M. Morgan, Everett, on a bid of \$150,725, received contract for building the 20,000,000-gal. reservoir for the city water department. Excavation necessary before lining the basin is estimated at 175,000 yd. Contract for laying north and south water main from the new reservoir to California Street has been let to the Western Pipe and Steel Company, Seattle, on a bid of \$51,962. Pipe will be 28 in.

Wash., Tacoma—City council has passed ordinance providing for replacing 2,508 ft. of 12-in. water main with 16-in. main, in East 11th Street, at a cost of \$20,850.

Miscellaneous

Calif., San Francisco—Purchases of the Standard Oil Company amounting to more than \$500,000 have been announced by Buckbee, Thorne & Co. An entire block in the North Beach district, bounded by Beach, Jefferson, Jones and Leavenworth Sts., 275 x 412.5 ft., was acquired and will be immediately improved as a distributing center. The Standard Oil Company will install fuel oil bunkering facilities, having leased a portion of pier 43 for this purpose.

Calif., Los Angeles—N. R. Powley, commercial superintendent of the Southern California Edison Company, stated that \$14,000,000 will be spent in the enlargement of the Los Angeles system, 500,000 new automatic telephones will be put in. New office buildings will be built

in Huntington Park, Hollywood, Vermont and Adams districts.

Calif., San Bernardino—The Arrowhead Portland Cement Company is planning to erect a \$1,400,000 cement plant along the Foothills and north of San Bernardino and east of Verdemon. Wm. F. May, manager.

Ore., Portland—The Hauser Construction Co., of this city, Eric V. Hauser, president, has been awarded contract to prepare site for an oil storage station at the U. S. Naval Station, Pearl Harbor, Hawaii. The contract includes extensive excavations and construction of retaining walls; price, \$1,200,000. The award was made by the U. S. Bureau of Yards and Docks, Washington, D. C.

Buildings (Miscellaneous)

Calif., Los Angeles—Stores and Offices—Architect Edwin Bergstrom, 1128 Citizens National Bank Building, is preparing working drawings for a 14-story and basement class A store and office building to be erected on the east side of Broadway south of 2nd Street, for Richard Garvey and associates. It will contain stores in the first story and 377 offices in the upper stories; steel frame construction; brick filler walls, pressed brick and terra cotta facing, plate glass windows, fire escapes, reinforced concrete floors, three elevators, steam heating, vacuum cleaning, marble and tile work.

Calif., Los Angeles—Hotel—Architects Eldredge & Jewell, 425 Pacific Finance Building, have completed plans for a 4-story hotel building to be erected at 825 W. 11th Street, for Melville Dozier; to contain 100 rooms. Brick steel joist construction, reinforced concrete, slab floors and roof, 70 x 110 ft., pressed brick facing, terra cotta trimmings, hollow tile partitions, cement floors to be carpeted, composition roofing, tile baths, automatic electric elevators, steam heating, metal lath, ornamental iron, steel sash, wire and plate glass, terrazzo floors, part basement, interior telephone system; \$125,000.

Calif., Los Angeles—School—Architect Arthur S. Heineman, 831 San Fernando Building, is preparing plans for a new school building to be erected at 3rd Street and Las Palmas Avenue for Cummock School for Girls. It will be 2-story, English style, approximately 250 x 60 ft., built around a court, and will contain an auditorium to seat 800 people, 12 class rooms, kitchen and dining room, and 50 dormitory rooms; brick and concrete fireproof construction, slate roofing; \$200,000.

Calif., Los Angeles—Stores—Architects Morgan, Walls and Morgan, 1124 Van Nuys Building, are preparing plans for a 2-story, class C mercantile building, to be erected at 7th and Coronado Streets, for Mrs. McKinley. It will be occupied by Gatch & Hill, decorators, and Philip Levy, confectionery. Dimensions, 50 x 100 ft., brick walls, plaster exterior, cast iron trim, comp. roofing, cement and wood floors.

Calif., Sacramento—Store—Plans for the erection of a 3-story and basement structure to cost approximately \$850,000 for Weinstock, Lubin & Company, have recently been announced by John A. Clecak. Cahill Bros. of San Francisco will be the contractors. The building will be a class A structure to be used entirely by the department store company which has signed a lease for a term of years.

Calif., Marysville—Plans for the proposed memorial auditorium to be built by Mrs. Phoebe Rideout at a cost of \$120,000 have been announced by Miss Julia Morgan, of San Francisco, architect for the structure. The building will be located on E Street between 8th and 9th and will be built under agreement with the Yuba County Board of Supervisors.

Calif., Sacramento—Hotel—Contract has been signed with Cahill Bros., of San Francisco, for the construction of the Hotel Senator at Twelfth and L Sts., to cost approximately \$1,500,000.

Calif., San Francisco—Apartments—Two new 5-story and basement brick buildings to contain 24 apartments and to cost \$50,000 each, have been planned by the Acme Investment Co. The buildings will be located on Leavenworth Street, north of O'Farrell.

Calif., Napa—Gymnasium—Contract for construction of the high school gymnasium has been awarded to Larsen & Seigrist on a bid of \$47,651.

Calif., Los Angeles—Architects Dodd & Richards, 905 Brack-Shops Building, are preparing plans for a class A office building to be erected at the southwest corner of 6th Street and St. Paul Avenue, for Dr. Rex Duncan, 1151 W. 6th Street. It will be 80 x 165 ft., reinforced concrete construction, pressed brick and terra cotta exterior, plate glass, marble and tile work, elevators, steam heating; \$500,000.

Calif., Pasadena—Bank—Offices—Architects Curlett & Beelman, 408 Union Bank Building, have been commissioned to prepare plans and specifications for a class A bank and office building, at the southeast corner of Marengo Avenue and Colorado Street, Pasadena, for the Pacific Southwest Trust & Savings Bank. It will be 8-story, basement and sub-basement, 146 x 214 ft., steel frame construction, pressed brick and terra cotta facing, marble and tile work, etc.; \$1,000,000.

Calif., Los Angeles—Offices—Architects Walker & Eisen, 325 Pacific Finance Building, are preparing plans for a class A office and loft building to be erected on Hill Street south of 8th Street, for I. C. Freud. It will be 13-story, 60 x 159 ft., reinforced concrete construction, pressed brick and terra cotta facing, plate glass, marble and tile work, elevators, steam heating; \$600,000.

Colo., Denver—Apartments—A brick apartment which will be the largest building in University Park, excepting those on the campus of the University of Denver, is being planned by Aaron M. Gove, local architect, for E. M. Curtis. It is being arranged especially for the use of students and when completed will cost over \$100,000.

Colo., Denver—Apartments—Construction has been started on a large downtown apartment house by Dr. J. Hamilton Jones, the finished cost of which is estimated by A. D. Wilson & Co., builders, to be about \$125,000. The building will contain 38 five-room apartments and three stores on the ground floor. Elevators, both passenger and freight, will be installed, also the latest lighting, ventilating, and refrigerating equipment.

Colo., Fort Collins—School—Bonds in the amount of \$330,000 were authorized at a special election for the construction of a new high school. Although the site has not been selected, the plans are under way and when completed the building will be of the latest design and equipment.

Ore., Portland—Apartments—A 4-story apartment house is to be erected by Herbert Gordon, costing \$150,000, on the northwest corner of 17th and Morrison Streets. Two-story apartment building to be built by David Liebreich, costing \$45,000, at 412 Sixth Street. A 4-story apartment house costing \$100,000 at 11th and Jefferson Streets is planned by Isabella M. Newton.

Ore., Astoria—Hotel—Stores—Another new building to be erected in the burned area will be at 11th and Commercial Streets and built by John H. Luukinen and Walter Harrison. The structure will be two-story concrete, covering 100 x 100-ft. site, and housing stores on the first floor and a 40-room hotel on the second floor. The cost is estimated at \$75,000.

Wash., Seattle—School—M. Hoard & Company, Pantages Building, has received contract for St. Margaret's School, to be two stories high, 100 x 168 ft., containing 18 rooms, and costing approximately \$85,000.

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May 15, 1923

Towers of Service

The constantly increasing number of electrical transmission towers is striking evidence of the abundant supply of electrical energy furnished by Western Power companies.

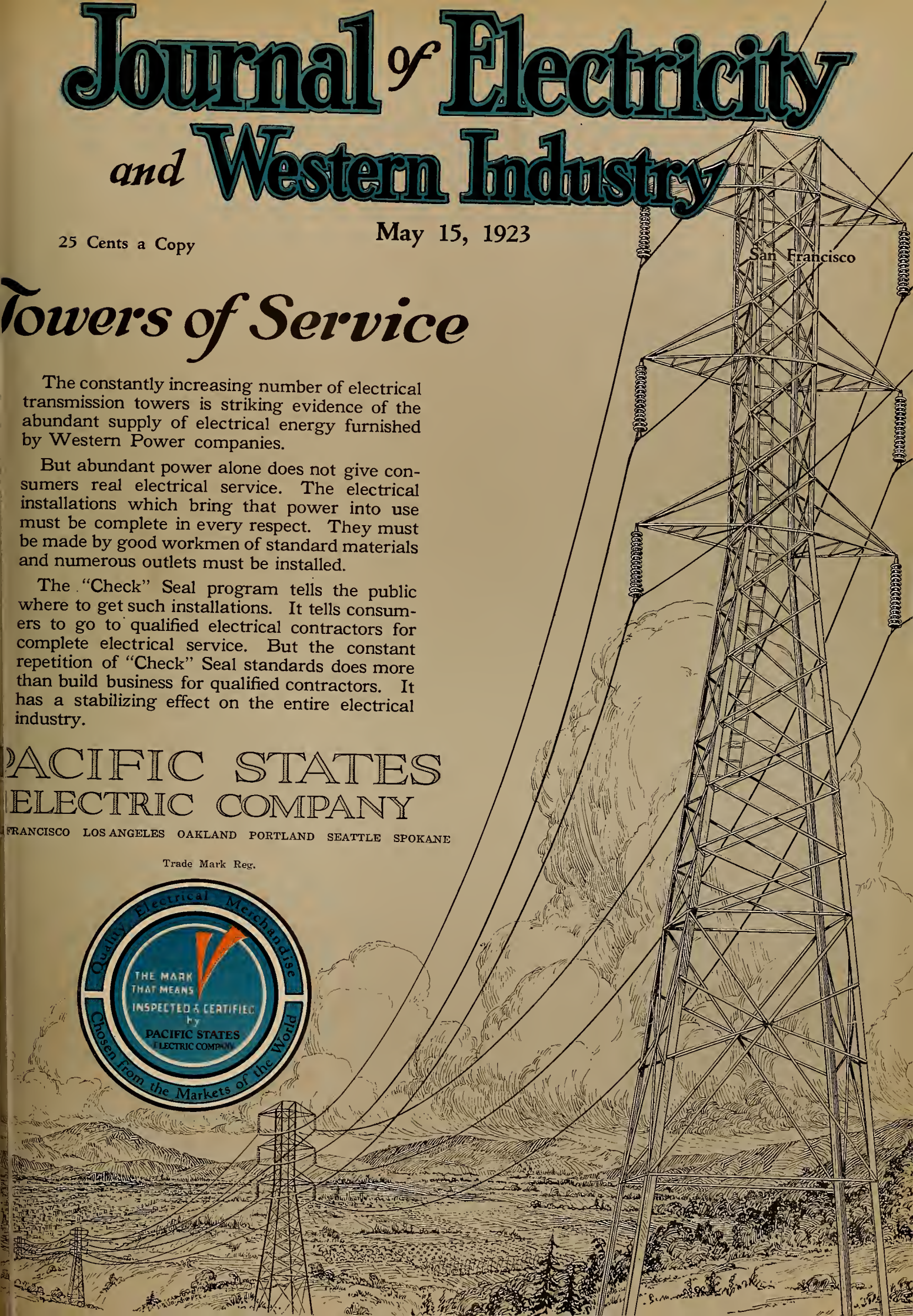
But abundant power alone does not give consumers real electrical service. The electrical installations which bring that power into use must be complete in every respect. They must be made by good workmen of standard materials and numerous outlets must be installed.

The "Check" Seal program tells the public where to get such installations. It tells consumers to go to qualified electrical contractors for complete electrical service. But the constant repetition of "Check" Seal standards does more than build business for qualified contractors. It has a stabilizing effect on the entire electrical industry.

PACIFIC STATES ELECTRIC COMPANY

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Go the Underwriters' Requirements One Better

WHEN the Board of Underwriters stipulates that "slow-burning" wire must be used in installing nitrogen lamps, they clearly recognize the peril of excessive overheating.

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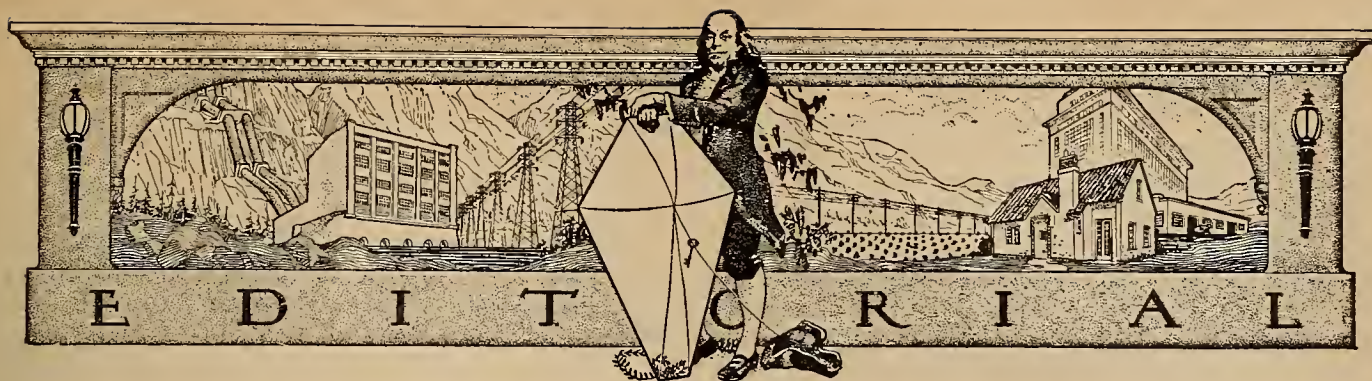
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Another Milestone Passed

IN many parts of the West, particularly in California, water power sites are located hundreds of miles from the large load centers. Hence long distance transmission of power is a necessary element in the development of water power in that state at the present time, since most of the close-in sites have been brought into production. Plants now being built and those projected to take care of the future demands for power are located from 150 to 240 miles from points where the power will be used. The cost of bringing this power to meet the rapidly increasing demand for it would have been prohibitive under the voltages of a few years ago.

ENGINEERS, after determining the carrying capacity of circuits of different voltages, decided that transmission of electrical energy at two hundred and twenty thousand volts was the most economical solution of the problem. Since the capacity of a 220,000-volt circuit is four times as great as that of a 110,000-volt circuit and the losses are only half as great in the case of two-circuit tower lines, it was decided that with properly distributed synchronous condensers 220,000-volt transmissions could deliver power over distances of 400 or even 600 miles with good efficiency and at not prohibitive expense. But many mechanical difficulties had to be overcome before a practical realization of the theory could be accomplished.

WHILE electrical manufacturers were willing to construct transformers to operate at this high voltage, insulators and oil circuit breakers capable of withstanding the tremendous stresses imposed upon them had to be developed. Within the past two years, engineers working in cooperation with scientists have proven by experiments that 220,000-volt transmission is commercially feasible.

ON May 6 the first actual operation of 220,000-volt transmission under service conditions was achieved by the Southern California Edison Company on its Big Creek lines. It is one of the greatest scientific advancements in electrical development and means much to the users of electric power and light. It insures the commercial development of vast water power resources located at distances from market centers, thereby adding much to the conservation of the water power resources of the world.

THE consumer's interest in this development, which constitutes a world's record, lies in the fact that by the adoption of 220,000 volts the Edison company will save \$7,000,000 in investment capital on the existing transmission lines, this being the difference in cost in constructing an additional circuit of 150,000-volt capacity and equipping the present lines for 220,000-volt operation. On the ultimate Big Creek installation, where over one million horsepower is under development for central and southern California, it will save approximately \$50,000,000 in the cost of constructing transmission lines. Measured by light and power bills, a saving of \$7,000,000 means a saving to the consumer of over \$600,000 per year. A \$50,000,000 saving on the ultimate development will mean a saving of the light and power bills of approximately \$5,000,000 annually.

OF the many economies and advances made by the western power companies in their effort to render the best possible service at the lowest cost, the achievement of electric transmission at 220,000 volts stands out as an event of great importance. It is indeed gratifying to record such instances where scientific advances are put to practical application for the ultimate benefit of the consumer.

Fostering Public Relations by Conducting Inspection Tours

THE trend of events in the public utility field has demonstrated that no organization can hope to survive and prosper unless its "public relations" are such that it can inspire and secure the confidence and sympathetic interest of the public in its affairs. Managing heads of electric utilities realize this and today no other branch of service is being given more constructive thought. The most outstanding evidence of this is the growth of customer ownership of utility securities.

Another means of stimulating an interest in the service of the power company, which one executive has characterized as "a practice which has done more towards cementing our public relations than any other means which we could possibly adopt," is the custom of conducting inspection tours through its various plants and substations. This can be accomplished with little expense, and where the idea has been tried such organizations as school teachers' associations, women's clubs, as well as the general civic and commercial bodies, have responded with enthusiasm. In addition to the personal visits to the plants these organizations welcome speakers who can deliver short talks pertinent to the electrical industry.

The problem of the development of a favorable public regard for the electric utilities, which are in truth community builders, extends farther than the managing heads. It is their duty to see that every employee is imbued with the same spirit. The executive who does not make every effort to develop and cultivate in the minds of all employees the thought that it is their duty to secure and hold the goodwill of the public is lax in his management.

Combine Business with Pleasure— Plan to Attend the Conventions

IN Spring the young man's fancy lightly turns to thoughts of—vacation, for instance. The railroad psychologists, in recognition of this annually recurring phenomenon, flood the mails with alluring folders depicting the joys of forest, stream and mountain. There are the bathing beaches, golf links and trout streams calling insistently from three-color posters to every man who has a drop of red blood in his veins.

"What is so rare as a day in June," to say nothing of four whole days in June, from the nineteenth to the twenty-second, during which the annual convention of the Pacific Coast Electrical Association will take place at the Fairmont Hotel, San Francisco? "Speaking of vacations," as Irvin Cobb might say, what more could one ask than to combine the opportunities offered by this event for recreation, instruction and the good-fellowship inspired by rubbing elbows with one's own kind under the most delightful circumstances?

After registration on June nineteenth there will be moving pictures, illustrative of some phase or phases of electric development, plus an opportunity to cement old and make new acquaintances and get our feet on the ground, so to speak, for what is to follow.

On the morning of the twentieth, President James B. Black will give his annual address, in which he will summarize the activities and accomplishments for the year past, and present his forecast of what the future will hold in store for us.

On the morning of the twenty-first there will be more sessions of the technical and commercial sections, while the afternoon will be devoted to swatting the elusive little white ball over the greensward, punctuated by cries of "Fore," "Out of bounds," and the refurbishing of the usual complement of alibis without which no golfer is complete. Charles C. Hillis is on the golf committee. Enough said.

On the twenty-second, the last day, the second business session will take place, to be followed by the Western Conference in the afternoon, and then, event of events, the banquet in the evening. It would not be fair to tell tales ahead of time about the banquet, but—it will be a banquet of banquets. San Francisco and the San Francisco members of the P. C. E. A. know how. There will be an address, perhaps several short ones, each with a punch. And then between addresses there will be—no, it wouldn't do at all to tell. You will have to come and find out for yourself.

Then on Saturday, the morning after the day before, there will be a trip to the top of Mt. Tamalpais and to Muir Woods, scenic wonders never to be forgotten. And, best of all—better than banquets, technical sessions, golfing or any of the more material pleasures of events such as this—is the joy of contact with one's own kind, the spirit of live and let live, the very essence of good-fellowship that smooths out the rough spots of our daily toil, that marks the line of demarcation between living and a mere existence.

Of equal interest is the Northwest Electric Light and Power Association Convention, from June 27 to 30, in Seattle, where the same hospitality will be manifested and similar problems will be discussed.

The Columbia Basin Project Is of Great Importance to the Northwest

OF great importance to the Northwest is the Columbia Basin Project, which will bring under cultivation 1,753,000 acres of desert land, located at the junction of the Snake and Columbia rivers, in the State of Washington.

To reclaim the vast area in the Columbia Basin it is proposed to store the drainage waters coming from 25,000 square miles in the northern Idaho and western Montana watershed of the Rocky Mountains. Initial storage will be secured in Flathead Lake in Montana, one of the largest bodies of fresh water lying wholly within the United States. Secondary storage is in Lake Pend Oreille, through the Flathead and Clarks Fork rivers. The Pend Oreille River ultimately drains both storage basins.

The point of diversion for water to irrigate the Columbia Basin is at Albany Falls, near Newport, 50 miles northeast of Spokane.

The average annual flow of the Pend Oreille River is 19,000,000 acre-feet, of which 6,250,000 acre-feet is to be diverted for reclamation.

The soil of the vast area to be reclaimed under the Columbia Basin Project is intrinsically rich. It is, generally speaking, a fertile volcanic ash soil deposited in a vast blanket when central Washington was the site of a prehistoric lake.

According to Gen. Geo. W. Goethals, who recently made an investigation of the project:

"The Columbia Basin Project is as much a national one as were the Panama Canal and the Alaskan Railway, and will, if completed, add much more to the national wealth than either of the others mentioned. The work should be provided for and carried out as were these other two national projects—by direct appropriation."

In 1922 the Columbia Basin Irrigation League was formed, with representatives from Idaho, Washington and Oregon. The project was kept before the proper officials at Washington, with the result that the last Congress appropriated \$100,000 for a federal survey, and this is now being made. Appropriations by the next Congress for actual construction will no doubt depend on this report.

General Goethals estimated the cost of irrigating 1,753,000 acres at \$145.56 per acre, with an annual cost of 48 cents per acre for operation and maintenance of irrigating system. The soils are among the richest in the world, and with water will be highly productive. The district is served by four great transcontinental railroad systems. It is estimated that a population of 500,000 will find homes and occupations here, and that their efforts will add \$200,000,000 per year to the productive wealth of the nation. This population will have an annual purchasing power of \$150,000,000.

It is obvious that the electrical trade is deeply concerned with the possibilities for new business that such a project opens up. Millions of dollars will be expended for electrical machinery, equipment, appliances and fixtures, and, once established, the market will be a constantly growing one.

Annual Reports of Power Companies

Now Designed for Consumer Owners

HUMANIZING of cold facts and hard statistics for the benefit of the layman, in the annual reports of the various western power companies, is a result of the great increase in security holders among consumers. "In place of the usual uninteresting recitation of facts and figures, presented in a stilted, stereotyped form in years past," says the National Electric Light Association Bulletin, in commenting on this subject, "the reports have taken on an attractive appearance and the information contained in them is presented in readable, understandable English, with necessary tabulations reduced to a minimum and greatly clarified."

Typical of this style of annual report is the "Year-Book" of the San Joaquin Light and Power Corporation which chances to be on the editor's desk at the moment. This report contains an interesting article sketching the part that this company has had in the development of its territory and giving a short history of its growth. Another article discusses the extent and character of the properties owned and

operated by the company. In addition, photographs of several generating station and graphic comparisons of gross operating revenue and kilowatt output, are given as well as descriptive scenes of generating stations and applications of electricity. The book also contains a map of the territory served by the company and its subsidiaries, showing the location of existing plants and transmission lines, and indicating proposed construction.

The annual report to stockholders is but a part of the attractive booklet and contains a departure worthy of adoption by other companies. The essential information of interest to stockholders is carefully explained in detail, and each item of the balance sheet has beneath it a short paragraph of explanation. The uninitiated are told in words of one syllable just what such mysterious terms as current assets, deferred charges, surplus and reserves really mean.

The modern annual report is indeed a step in advance and will promote a better understanding on the part of the readers, who are for the most part unfamiliar with the problems of the central station, of how the kilowatt hour is made and sold.

Electric Light and Power Industry

Now Among Largest in Nation

THE public utility must not only keep pace with the development of the country, but ahead of it. The service must be there when the population arrives. In order that this may be accomplished the utilities necessarily require a steady life-preserving flow of new capital.

The privately owned electric light and power companies will contribute substantially to the prosperity of the Nation during the current year. More than \$600,000,000 will be expended by them for extensions and additions to meet the demand for service.

In 1880 the population of Continental United States was 50,000,000. In 1920 it was 105,000,000, an increase of 117 per cent. The entire capital invested in the electric light and power industry in 1890 was less than a billion dollars. Today this industry has a capitalization of over \$5,000,000,000, representing an increase of over 500 per cent, with annual gross earnings of \$1,000,000,000. The securities of this vast industry are held by 1,750,000 of the nation's citizens.

The total value of the extensions and additions planned for 1923 for privately owned companies is estimated at \$602,000,000. This figure includes central generating plants, transmission and distributing systems, and is approximately 86 per cent more than was spent last year, and \$387,000,000, or about 180 per cent more than was spent in 1921.

Additional equipment to generate 2,890,000 kw. will be installed, of which 68 per cent will be in steam plants and 32 per cent in hydroelectric stations.

In 1923, \$209,000,000 will be spent to increase the country's steam plant capacity. This is more than double the sum similarly spent in 1922 and more than four times the 1921 figure.

CURRENT COMMENT



California is entering an unprecedented era of activity in development of its water resources, according to the biennial report of the Division of Water Rights of the Department of Public Works. Applications received to date indicate intentions to irrigate 17,000,000 acres, nearly three times the acreage under present constructed systems. Future power development is forecast by the receipt of applications for the development of a total of 9,350,000 theoretical horsepower as against the 1,250,000 hp. constructed at present.

Future development of California water resources must depend largely upon storage of flood waters as present projects utilize the greater part of the low flow of the stream. That this is realized is indicated by the fact that there have been received by the Division of Water Rights applications for the storage of 100,000,000 acre-ft., which is fifty times the present constructed storage capacity.

Every phase of the work of the division is described in the report, including the investigations of the super irrigation district on the Kings River which will irrigate 1,000,000 acres of land. The importance of return water from irrigation is discussed in detail, the report showing that nearly 900 cu. ft. per second returns to the streams of the San Joaquin Valley during the summer months.

With no complaint on service or rates, with the company meeting all requirements for a renewed franchise submitted or countered by the city administration, the Colorado Springs Light, Heat & Power Company, a United Gas & Electric subsidiary, is engaged in a battle for its life. Its franchise for supplying power and gas to Colorado Springs and part of the Pike's Peak region in Colorado is about to expire and a new one covering a period of 25 years has been requested and will be voted upon June 12 by the taxpayers of Colorado Springs at a special election, the expense of which must be borne by the central station.

Colorado Utility Threatened With Public Ownership

Street corner arguments, luncheon club discussions, back alley rumors, debates in which strong language is used, all seem to concern the "franchise." Few people are outspoken in its favor, while many vehemently denounce it. The city council, contrary to all precedent, took the lead in this respect by passing judgment on the proposed franchise, and in a

resolution of scorching language, telling the voters of Colorado Springs to defeat the measure.

There does not seem to be a fifty-fifty spirit in the matter—indeed, an absence of good sportsmanship is noted. "Kill the light company and make it suffer for the sins of yesteryear" seems to have become the slogan. Few citizens seem to be introspecting and asking themselves if the proposition is economically sound and fair to the taxpayers. And because the city refuses to offer a counter proposition, some citizens are asking if there might be an underlying or ulterior motive. Those are the people who sense the possibility of the city operating the hydro-generating plant near Manitou, which, under the terms of the previous franchise, is passed to the city.

An irrigation engineer has reported ample water to meet all requirements at the plant with certain improvements. The company operates a steam plant and claims the hydro plant and water supply is inadequate. Prominent hydroelectric engineers have supported the latter contention.

Because of the belief established in the special city engineer's report and certain alleged inconsistencies, the company has secured the services of General George W. Goethals and he is now making a survey of the Colorado Springs water situation. It is generally admitted that his report and recommendations will carry considerable weight, providing they are decisive, because of his unquestioned ability and integrity.

The electrical industry of Colorado and especially the utilities are much interested in the situation. Assistance is being given to the company wherever possible. On the shoulders of O. F. Lackey, vice-president, and J. F. Dostal, general manager, and president of the Rocky Mountain Division of the N.E.L.A., has been placed the burden of preventing municipal ownership and operation of their company in the third largest city of Colorado.

Approximately 300 sq. miles of highly mineralized territory and rich farming and grazing land in northwestern Nevada and southern Idaho will be given transportation facilities as the result of the construction of the Idaho Central Railroad, the certificate for which has been purchased by Conrad Wolfe, mining engineer of Oakland, Calif. The line will connect Wells, Nev., and Rogerson, Idaho, and will be ninety miles long.

New Railroad Would Open Nevada Land

A certificate for the construction of the line was issued to Arthur Dunn and George L. Davis of San Francisco in July, 1921, by the Interstate Commerce Commission. They were unable to finance the project and after preliminary surveys were made, the matter remained at a standstill until recently, when the certificate was purchased by Mr. Wolfle. It is expected that actual construction will begin early in the summer.

The town of Rogerson, the northern terminus of the new railroad, is the southern terminus of a branch of the Oregon Short Line, extending from Minidoka, Idaho, where it connects with a chain of cities, among which are Twin Falls, Hansen, Buhl, and several others of considerable size and importance. Wells, the southern terminus, is a point in Nevada, at which both the Southern Pacific and Western Pacific are reached. In the Interstate Commerce Commission docket, the findings of the commission state that the line in question will "furnish a more direct route to California and particularly to the markets of San Francisco and bay cities. Access to San Francisco is greatly desired by shippers and travelers in southern Idaho. The new line will shorten by 311 miles the distance from Twin Falls to San Francisco by one route and 350 miles by the second route, and the inference drawn is that products now being shipped east will be diverted to the California markets."

Conrad Wolfle, the president of the new railroad, is also president of the Riverside mine, and the proprietor and manager of the new townsite of Riverside. He was formerly a mining engineer of Spokane, Wash., and is a member of the American Mining Congress and American Institute of Mining Engineers.

The Electric Supply Committee of the City of Melbourne, Australia, will attempt to boost electric housekeeping by the purchase of approximately \$5,000 worth of foreign-made electric cookers and other domestic electric appliances which will be displayed in the town hall.

Australian City Will Display New Appliances

It is hoped that by such a display the use of current will be considerably increased. The chief present electric power plants in Melbourne are owned and operated by the city. Rates, which are now comparatively low will, it is expected, be lowered still farther as the result of the completion of a new generating plant. Electric housekeeping is already popular among the more up-to-date Melbournians, and the Electric Supply Department of the city government believes by giving the public ocular demonstration of the operation of heating, cooking, and lighting appliances, it will make their use general.

The Melbourne town hall is located on the corner of Collins, Melbourne's "Main Street," and Swanson Street, which is one of the main avenues of tramway traffic.

The step taken by this Australian community is one that might well be followed in American cities.

Such displays, whether maintained by the central station, dealers as a group or the jobbers, is bound to have a beneficial effect on the sale of appliances.

Sales of electric power for industrial purposes in the seven western states comprising the Twelfth Federal Reserve District continue approximately 20 per cent greater than a year ago, according to the regular monthly report of the Federal Reserve Bank for that district. Available figures for Feb., 1923, re-

Power Sales Show Marked Increase

ported by 20 of the principal power companies, show increases in sales in the manufacturing, mining, lumbering, oil producing and agricultural industries, the total increase as compared to Feb., 1922, being 21.7 per cent. Percentage comparisons of sales by certain industries and by sections of the district are presented in the following table:

| Percentage Increase February, 1923, compared with February, 1922 | | | | |
|--|-------------|--------|---------------|------------------------|
| | Agriculture | Mining | Manufacturing | Total Industrial Sales |
| California..... | 47.3 | 2.4 | 33.0 | 15.6 |
| Pacific Northwest..... | 50.6 | 21.5 | 16.7 | 10.0 |
| Intermountain..... | 79.4 | 19.6 | 37.5 | 91.9 |
| Twelfth District..... | 49.1 | 9.0 | 28.8 | 21.7 |

The large increase in sales to agricultural consumers is partly the result of the needs of California farmers for power to operate irrigation systems during the recent dry spell in that state, which commenced about the middle of February. The reported increase in sales to the lumber industry of the Pacific Northwest, which is not shown in the above table, was 24.7 per cent, and to the oil producing industry of California, 24.0 per cent.

Figures showing the number of industrial consumers and industrial sales of 20 reporting power companies during Feb., 1923, and Feb., 1922, are shown in the following table. It is noteworthy that, whereas the number of industrial consumers in the Intermountain section is slightly less than a year ago, their current purchases of electric power are approximately double the figures for last year.

| | Number of Industrial Consumers | | Industrial Sales Kw-hr. | |
|------------------------|--------------------------------|------------|-------------------------|-------------|
| | Feb., 1923 | Feb., 1922 | Feb., 1923 | Feb., 1922 |
| California..... | 55,919 | 48,847 | 163,910,223 | 141,748,548 |
| Pacific Northwest..... | 14,333 | 13,385 | 63,807,405 | 58,005,918 |
| Intermountain States.. | 4,980 | 5,427 | 42,359,847 | 22,068,438 |
| Twelfth District | 75,232 | 67,659 | 270,077,475 | 221,822,904 |

The figures in the Federal Reserve report are borne out in the case of northern California by data which have been compiled by W. G. Vincent, Jr., vice-president and executive engineer of the Pacific Gas & Electric Company. The figures show that during the past month 4,240 new consumers were added. A total of 11,545 were gained during January, February and March, 1923, as compared with 5,782 for the same period of 1922. During the year ending March 31, there was a gain in connected power load of 34,342 hp., the major portion of which consisted of 11,178 hp. in agricultural motors and 21,739 hp. in manufacturing power, thus indicating a healthy growth in both the agricultural and industrial centers.



COMMUNICATION building of the Southern California Edison Company located at Cascade near Big Creek No. 1 power house. In the building are housed the radio, telegraph and telephone equipment necessary for the construction work in progress.



THE common agencies of communication now being utilized by the various power companies of this country are, the wire telephone, wire telegraph, "space" radio telephone and telegraph, and, recently, the power transmission line "carrier current" radio telephone and telegraph.

There is no doubt but what each means of communication has its respective application for the various requirements of the power companies, and it is the general intent of this report to briefly outline what application some of the member companies are making of the different methods; mention the principal advantages and disadvantages of each type, and then express a few conclusions.

Since the wire communication systems have been quite highly perfected for some time, little will be said of this system other than to discuss some of the common troubles experienced in this means of communication.

Realizing the need of an auxiliary means of communication to supplement the wire system, when the latter is in trouble or out of service, many of the power companies have turned to "radio" to serve in this capacity. Also, some of the power companies have been utilizing "space" radio for general communication purposes between construction camps and headquarters camps.

During the period that power companies were carrying on experiments with "space" radio, it was discovered that a power transmission line could be used to act as a "carrier" for the high frequency energy of the radio transmitter, provided the transmitting and receiving antennae were properly

IN the accompanying report of the Sub-Committee on Communications of the Technical Committee, Pacific Coast Electrical Association, three types of communication used by western power companies have been studied. Communication troubles on wire communication lines are discussed, as well as the development of "space" radio and "carrier current" radio as applied to power company use.

arranged with respect to the power line. The amount of power required to transmit a given distance in this manner, under normal conditions, when compared to "space" radio, was found to be many times less. This system of communication has recently been quite extensively developed by the General Electric Company and others, and offers a very satisfactory means of auxiliary, and under certain conditions, general communication.

Since most of the "carrier current" installations have been but very recently installed, not a great deal of reliable information is available at this time relative to their actual operation during times of trouble on "carrier line," such as to permit any very definite conclusions being drawn as to the possible ultimate application of this means of communication.

Wire Communication

Communication Troubles on Private Wire Lines:—

1. Communication Troubles Resulting from Storms, Earthquakes, Etc.

Inasmuch as it is impracticable to construct communication lines to withstand extreme storm conditions, this phase of the subject will not be discussed, other than to urge a conservative type of construction in all cases.

2. Communication Troubles Resulting from Inductive Interference.

Due to the usual extreme proximity of the private wire communication lines to the power transmission lines for long distances, often severe inductive interference troubles are experienced in the private wire communication lines.

Since this class of trouble, during normal transmission line operating conditions, can be greatly reduced and often almost eliminated by careful design, particularly as regards

Sub-Committee on Communication:

M. L. Baden (chairman), R. S. Daniels, E. A. Crellin, C. F. Benham, R. C. Denny, H. N. Kalb, R. B. Ashbrook, J. O. Case, F. M. Pease, A. B. Vandercook, T. J. Johnson, R. A. Hopkins.

proper transposition of both power and phone lines, some of the experiences of member companies have been solicited and briefly summarized, as follows:

- (a) Proper transposition of both power and communication circuits of utmost importance.
- (b) Use of copper conductor is urged for all communication lines, particularly for long ones.
- (c) Over insulation of line very desirable.

"Space" Radio Communication

As Applied to Power Company Requirements

Communication by means of "space" radio is being utilized by several of the western power companies, among them being the San Joaquin Light & Power Corporation and the Southern California Edison Company.

The San Joaquin Light & Power Corporation* recently made very satisfactory use of two spark-type "space" radio stations for communication between their main office at Fresno and a hydroelectric plant under construction at the mouth of Kern River canyon, a distance of 120 miles.

More recently Mr. Denny, operating engineer of this corporation, has been devoting his spare time to the construction and testing out of an inexpensive radio-phone transmitter of somewhat special design, such as to meet the requirements for power companies' service. A description by R. C. Denny of this transmitter, as well as the San Joaquin Light & Power Corporation's experience with the radiophone, follows:

Cognizant of the need of an emergency means of communication to carry on system dispatching during periods when the telephone lines were disabled, the San Joaquin Light & Power Corporation of Fresno, California, in the fall of 1921 undertook the development of a practical radiophone. The chief requirement in such an instrument was that of consistent operation day or night over a maximum radius of 135 miles from the dispatcher's office at Fresno in a southwesterly direction. The distance requirements in other directions were approximately half as great. Owing to the fact that these shorter distances were over a mountainous country into deep canyons the requirements were nevertheless quite severe.

The fact that transmission was desired in all directions out from the operating center of the system rather eliminated from consideration the "wired wireless" or "carrier current" system due to its limitations. Moreover, the failure of communication is in the majority of cases incidental or secondary to failures of the transmission lines, which would render the "carrier" system useless in case either telephone lines or transmission lines were used for the purpose, and just at the time it was most needed.

Obviously, then, to be practical under the most adverse conditions, emergency communication must be entirely separate and independent of the lines. Manifestly it is only adverse conditions constituting emergencies, that really justify any system of radio, as fully 95 per cent of the time the line telephone system functions properly and is entirely adequate. Therefore, in view of the notorious inefficiency of radio transmission, it would seem inadvisable to use any form of radio where the telephone would suffice, except of course for emergencies.

This is true particularly in the case where radio is applied to systems where telephone lines already exist and where they are strung beneath the transmission lines. It is admittedly a fact that on new projects where long transmission lines are to be built, that the "carrier current" phone system may be used for routine work, over the transmission conductors in lieu of building separate telephone lines and a saving is thus effected, providing the initial cost of the carrier current apparatus is kept within reason. Unless the transmission lines are provided in duplicate it is rather

doubtful if the carrier system would suffice in the case of line failures where one or several spans were down, tangled up and grounded.

It is doubtful if the "carrier current" system will be of any great value in emergencies. Apparently, each of the two systems of communication has its own field; the radiophone, where an extensive interconnected transmission network of one, two or three voltages is to be talked over in any or all directions, and the "carrier current" scheme for talking over especially long and important transmission lines where communication is desired only at the terminals thereof. In fact, several companies are adapting the "carrier current" system to certain more important stretches of their transmission system because of the Government radio regulations, which are rather inclined to handicap the use of the radiophone by private corporations, even for emergency operation. Whether it will prove entirely successful with them in emergencies is yet to be demonstrated.

Another requirement to be met in the development of a practical radiophone for emergency use, was that it should not cost more than was commensurate with successful and consistent operation. Another was that it should be simple in operation and adjustments and of low maintenance expense. With these and the distance requirements in mind the writer set about the development of such a radio telephone set. At that time, and with only the experiences of two other radio telephone installations to be judged from, it was decided that a set of 50 watts output rating, if that output be properly modulated, would meet the distance requirements. Advice from several of the large manufacturers that at least 250 watts would be required, and that 1,000 watts was recommended, did not affect the original decision.

From the outset it was decided to eliminate the one item of greatest expense commonly used in such sets, that being the motor-generator set for the production of high voltage direct current. Experiments with an electrolytic rectifier proved conclusively that alternating current could be used, if the resultant pulsating direct current could be sufficiently filtered or smoothed out to minimize, if not eliminate, the fundamental hum. It was soon demonstrated that the chemical device for rectification was inadequate for constant use on currents even as low as 300 milliamperes at 1,000 volts, due to overheating. Besides being very inefficient it was cumbersome and mussy, which rather precluded its use in a compact and finished set. Having served the very useful purpose of demonstrating the possibilities of rectified a.c., it was discarded in favor of vacuum tube rectifiers.

It was also very desirable to use alternating current for heating the filaments of the various vacuum tubes to be used in the set. Besides being more economical than storage batteries, much more simple than low voltage generators, and more easily regulated, it actually results in a longer filament life as the emission is more even from all parts of the filament. In actual service it was found very feasible to use a.c. for this purpose if certain precautions were taken, that is, to bring out the center tap of the transformer winding for connection with the negative high voltage lead which forms the negative or common connection for the entire set. One microfarad telephone condenser should be bridged across from this center tap to each end of the winding, these to serve as a low impedance path or bypass for the high frequency currents from the oscillator tube. Ordinary potential transformers were rebuilt or remodeled for the purposes of filament heating and high voltage for the rectifier. These, too, proved to be inadequate due to overheating when used continuously, but served the purpose of permitting the experimentation to be carried on while properly designed apparatus of adequate capacity was being developed by radio manufacturers.

*See article by R. C. Denny, *Journal of Electricity and Western Industry*, Nov. 1, 1922. Also *Electrical World*, Aug. 6, 1921.

One thing that became apparent in the early stages of the experiments was that of the necessity for low antenna resistance. An aerial and ground system that had been perfectly satisfactory for the spark system of radio telegraphy, employing spark frequencies on the order of 1,000 per second, would not serve at all for the high frequencies of the radio-phone carrier wave which was something over 833,000 cycles at the particular wave length at which the experiments were carried on. Accordingly, a counter capacity antenna or counterpoise was designed having the same physical dimensions as the antenna and erected directly beneath the antenna and parallel to it at a distance of 40 ft., this being influenced by local conditions. Every precaution was taken to keep the ohmic resistance as low as possible, stranded copper conductors being used, heavy leads employed and all joints soldered. A marked increase in radiation was the result, practically $3\frac{1}{2}$ times the former current. It was found possible to further increase the radiation by connecting the ground lead to a certain point on the inductance coil, so that with the combination of counterpoise and ground connection, the radiation was four times that obtained with ground alone.

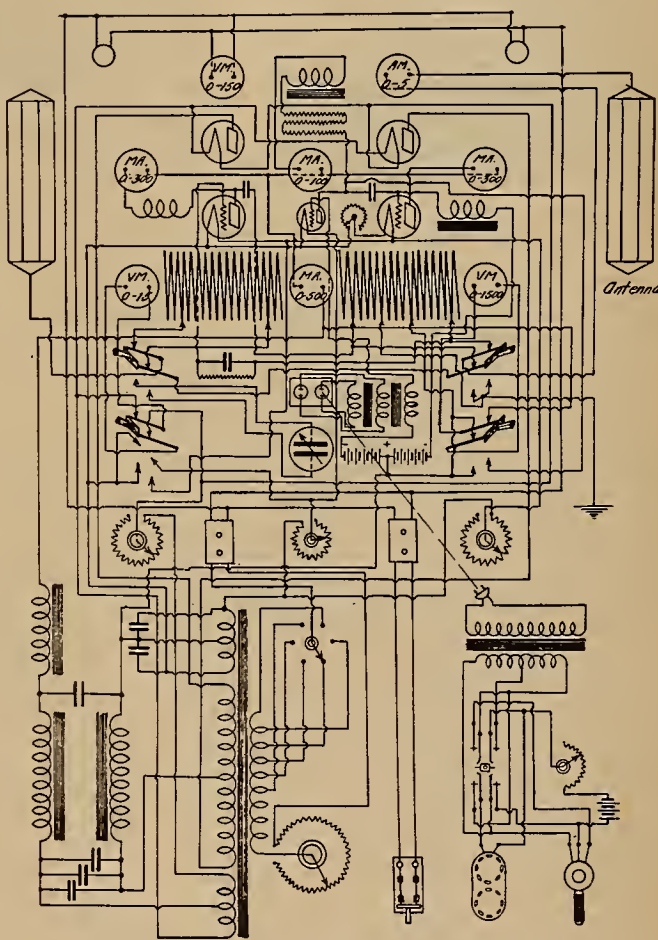
In order to bring in reports from all directions on the operations during the experimental development of the radio-phone it was necessary to do a certain amount of broadcasting. Another and fully important reason for broadcasting was that of stimulating an interest in radio among the power house and substation employees about the system. It was considered that such interest was vitally important to the successful future operation of an emergency radiophone service. This was done under an experimental license until a ruling of the Department of Commerce necessitated taking out a special broadcasting license for the purpose. It was thus that the corporation's broadcasting station KMJ came into existence, but with the idea of broadcasting station secondary to the development of the set for use in emergency communication.

After many months of delay occasioned by the inability to get satisfactory tubes and apparatus, hardly any of which were more than out of the experimental stage and on a production basis, a complete set of standard parts was evolved. A satisfactory filter system had in this time been developed, utilizing the primary winding of a 1-kw., 2,300-volt distribution transformer as a choke, the two coils each in series with one side of the rectified high voltage supply. Three one-microfarad condensers insulated for 1,750 volts were shunted across this circuit on the power side and one on the radio side. A special but standard transformer of 750 watts rating was used for the one source of power. This transformer has one primary winding with taps for operation on from 102.5 to 115 volts, and three secondary windings, two of which give 10.5 volts for filament heating and one 3,000 volts for the rectifier tubes. Each of these secondary windings has its center tap brought out, which connection is absolutely essential. It was found in actual practice that this transformer, which is of the dry type, when operating continuously at just full load for an hour at a time became dangerously hot. For this reason it was necessary to rearrange the terminal connections, solder on long leads and saw out sections of the end shells to prepare the transformer for operation under oil. It was put into a 1-kw. distribution transformer case, submerged in oil, and the operation since has been entirely satisfactory. Owing to the primary voltage sometimes going above the transformer voltage rating, a 40-ohm rheostat was provided in the primary circuit. Power for the set is supplied from the 115-volt lighting circuit of 60 cycles frequency. Entering the set through a fused knife switch it passes through a flush-type lock switch to the main power bus and thence to the bracket lamps and a.c. voltmeter. This meter indicates which voltage tap to work on, so the tap selector

switch is moved to the proper point and with the primary resistance all in the flush push switch is snapped on. The primary resistance is then cut out gradually and the set brought up to normal operation.

Power tubes of 50 watts output rating are used, one as an oscillator and the other as the modulator. The constant current system of modulation is used in connection with a 5-watt speech amplifier. A special reactor of 300 milliamperes capacity being used in the main positive lead to the plates. The power tubes require at least 1,000 volts on the plates while the speech amplifier tube requires 350.

A resistance of 15,000 ohms having a continuous carrying capacity of at least 50 milliamperes was found necessary to reduce the voltage to the proper value. This resistance was composed of three standard 5,000-ohm resistors. A d.c. voltmeter is provided which by means of a two-pole, double-throw switch may be thrown on power tube plate circuit or upon that of the amplifier tube. The rectifier tubes have an output rating of 150 watts each and the two carry a load of 300 milliamperes at 1,300 volts without undue heating. Two



Wiring diagram of the radio apparatus of the San Joaquin Light & Power Corporation

standard rheostats of 15 amperes continuous carrying capacity are provided, one for each set of tubes that operate in multiple. An additional rheostat is provided for the modulator tube which sometimes requires a slightly different adjustment than the oscillator. A separate rheostat is provided for the speech amplifier tube which requires considerably lower voltage for its filament. The constant potential method of filament control is used rather than maintaining the constant rated current throughout the life of the tube. It is found that this method greatly prolongs the life of a

tube, as the current is automatically reduced as the filament resistance increases due to disintegration. An a.c. voltmeter is provided for this purpose which by means of a two-pole, three-way switch may be thrown upon either the rectifier tube bus or the power tube bus or onto the speech amplifier tube and the voltage adjusted by means of the respective rheostats. The plate current of the oscillator and modulator tubes and the speech amplifier tubes are indicated separately by milliammeters and collectively by one meter which gives the total load on the rectifier tubes.

In the oscillatory circuit are utilized two standard inductance coils of 25 turns each, two fixed-capacity 3,000-volt mica condensers of .002 mfd. each, one variable mercury mica condenser of .0012 mfd. insulated for 4,000 volts, and one 5,000-ohm resistor which is used as a grid leak on the oscillator tube. One of the inductances is to be used as a loading coil for long wave work, while the variable condenser is for short wave work, either of which may be introduced into the counterpoise lead by the proper operation of a two-pole durable throw switch. Another two-pole, double throw switch is provided which is used to either connect the antenna and counterpoise to the active inductance or to ground them both. Small choke coils of 1-henry reactance at audio frequencies are inserted in the grid circuit of the modulator tube and the plate circuit of the speech amplifier to prevent the dissipation of the audio frequency impulses and practically forcing the effect of the speech amplifier upon the grid of the modulator tube. A radio frequency choke coil is inserted in the plate lead of the oscillator tube to prevent the high frequency output of that tube getting back into the other circuits. The output or plate circuit of the speech amplifier tube is capacitively coupled to the grid of the modulator by means of a $\frac{1}{2}$ -mfd, 1750-volt condenser. Negative potential for the grids of the two tubes is supplied by small dry batteries, the values approximating 30 volts.

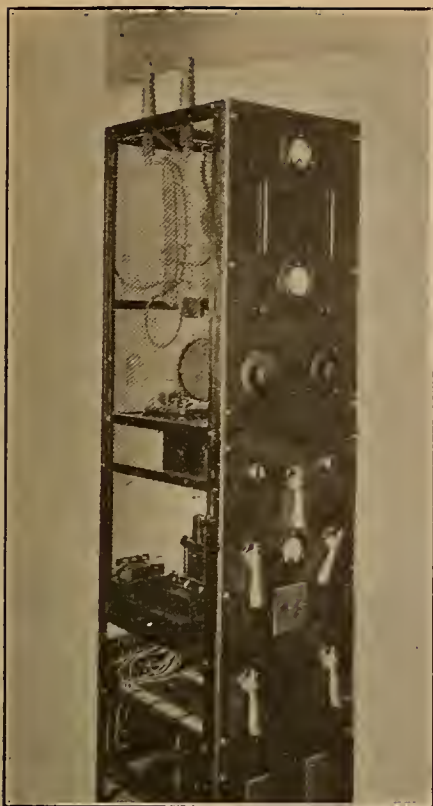
A three-winding modulation transformer is used, the secondary of which connects with the grid of the speech amplifier tube. The primary winding connects with a receptacle on the panel for external connection to the speech input circuit. The tertiary or third winding also connects to a receptacle so that the input may be monitored by plugging a telephone receiver in on it. The microphone system which is external to the transmitting set proper, consists of an induction coil with center tap of primary winding brought out for connection with differential transmitter which is a hand set used for announcing. The other transmitter is an especially sensitive device used for picking up vocal and instrumental music rendered in the studio. A four point double throw telephone key switch serves to throw from one transmitter to the other, while the one battery and rheostat are used for both transmitters, the rheostat to control the volume.

So much for the detail description of the set, which may be followed through with the aid of the wiring diagram presented herewith. The set was designed by the writer and built up switchboard style in the shops of the Corporation as illustrated in accompanying front and interior photographs. The fact that the set is principally used for broadcasting does not mean that it contains any special features except the pickup transmitter which does not materially add to the cost of the set. In fact, built of standard parts as it is, there is no reason why the set can not be duplicated by any of the power companies having even meager shop facilities, at a total cost of \$750. It may be built for less but hardly in such compact shape. It would be inadvisable to reduce the cost by eliminating any of the meters as they are very essential to the proper adjustment of various circuits. Needless to say, the set may be used for carrier wave transmission just as well as for radio, with certain additional apparatus for transferring the output to the lines.

Operating at normal power input rating, on a 4-wire flat top T-type antenna 75 feet high and 175 feet long and a counterpoise of similar dimensions, this set has a normal radiation of 4 amperes at 360 meters, which is indicated by a radio frequency ammeter of the thermo-couple type. Modulation, effected by speaking or whistling into the transmitter produces from two-tenths to one ampere variation in the radiation. This is known as the percentage modulation and it is upon this that the voice range of the set depends to a large extent. It is possible to get a higher percentage modulation but hardly without distortion. To briefly summarize the results obtained with this set; of the total number of reports on overland reception of speech and music from same, 2% were over 2500 miles from Fresno, $1\frac{1}{2}$ % between 2,500 and 2,000 miles, 2% between 2,000 and 1,500 miles, 7% between 1,500 and 1,000 miles, $51\frac{1}{2}$ % between 1,000 and 500 miles and 37% within 500 miles. Practically every report pronounced modulation excellent and volume good. One person at a distance of 700 miles reported hearing ten consecutive concerts which rather proves the operation consistent. On several occasions conversations have been carried on by voice with Portland, Oregon, a distance of 850 miles, and on one occasion with Denver, Colorado, at 865 miles, the latter conversation being overheard in its entirety by a novice in Dayton, Ohio, 2,012 miles from Fresno. The remarkable thing about this record was that the novice used only a simple regenerative detector set without any amplification. These records were practically all made at 360 meters operation and subject to interference from a multitude of other stations broadcasting at the same or very nearly the same wave length. Therefore, it is obvious that operating at much higher wave lengths, which would be the case in emergency operation as limited commercial stations, there would be practically no interference which would allow of very consistent results.

These records might seem to indicate that much more power than necessary was being used to cover the power system in question. Possibly so, but the next size smaller power tube has an output rating of only 5 watts which is obviously not enough. Operating tubes in multiple to increase the output rating of a set is not particularly satisfactory without a complication of controls and meters which immediately runs into an expense. For such reasons it was considered inadvisable to experiment with less than a 50-watt tube; also it was felt that for operation through the summer months such capacity was not excessive.

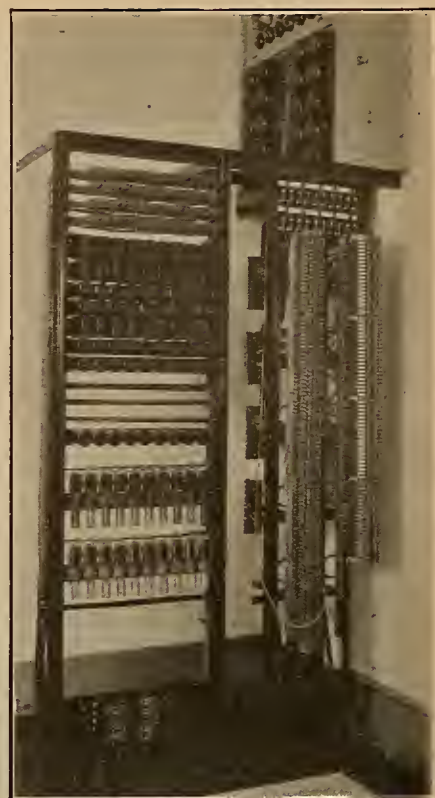
While it was not the intention that problems of reception should be within the scope of this article, the writer desires to remark that in his opinion the success of duplex operation of the radio telephone will depend largely on the receiving end; but after all this is largely a matter of training the operating personnel. Broadcasting is having just that effect, not merely the Corporation's efforts, but broadcasting in general is serving to acquaint the power man with receiving sets, getting him accustomed to the more or less delicate adjustments of the instruments. Numerous receiving tests made about the San Joaquin system have well demonstrated the success of ordinary receiving sets employing one or two stages of audio frequency amplification, connected with outdoor antennae; however, before duplex operation of the radio-telephone can be any complete success, it will be necessary to resort to loop reception and radio frequency amplification. This will permit stations transmitting at one wave length and while transmitting, receiving at another wave length without interference from their own transmitter. This is the next problem to be attacked, now that much has been learned about radio frequency amplification. A complete receiving set including loud speaking device should not cost



Experimental transmitter of the Southern California Edison Company.



Radio transmitter used by the San Joaquin Light & Power Corporation.



Protection and relay rack in the Communication Building of the Southern California Edison Co.

over \$250, making a total investment of perhaps \$1000 for a complete two-way radio station.

The Southern California Edison Company now has eight continuous wave radio stations in operation, three of which have been in use almost continuously since Dec. 1, 1920.* An outline description of these stations by R. B. Ashbrook follows:—

"Space" Radio Communication of the Southern California Edison Company

This company has at present eight radio telegraph stations in operation, five of which are equipped for radiophone service.

The uses of radio communication are at present confined to construction camps only, although experiments are under way to determine feasibility for operation.

The antenna equipment differs somewhat in each installation. They are usually flat top 5-wires, spaced 4 ft. in each case, the length from 120 ft. to 200 ft., depending upon whether inverted "L" or "T" type. In mountainous country we utilize the trees as means of support.

The counterpoise is used where it is difficult to obtain a satisfactory ground.

The average cost for each antenna and counterpoise for our low wave sets (527 meters) is approximately \$500. For the 1,650-meter stations the cost would be about \$800, but at present we obtain the longer wave length by loading the antenna. The stations in the vicinity of Los Angeles are operating on 1,650 meters and are of ample power and can sacrifice the loss of power in loading without affecting the operation. The wave length of 1,650 meters for this section was occasioned by the great number of stations in this vicinity operating on the lower waves.

All transmitters are of the vacuum tube type, some of which are equipped with phone but C.W. telegraph is being used exclusively.

The transmitters were purchased from the DeForest Radio Tel. & Tel. Co. in 1920, for \$1,500, and are rated at $\frac{1}{2}$ -kw. input. They are equipped with two 60-watt vacuum tubes which deliver 6 to 7 amp. in the antenna at 527 meters.

The receiving apparatus is of the regenerative type, with two stages of audio frequency amplification. Our intention is to obtain ample power at the transmitter to require the use of a detector tube only, but in some sections of mountainous country the cost of a transmitter to give this result is almost prohibitive.

The receiving sets were also purchased from DeForest Tel. & Tel. Co. at a cost of approximately \$200 and are of the honeycomb coil type.

The geographic conditions affecting operation in rugged mountainous country are very marked. We experience considerable difficulty in transmitting 16 miles, especially at night, although our signals are reported of ample strength to be copied on a typewriter in New York State and the Hawaiian Islands. We expect to experiment this coming summer to determine an optimum wave length which will minimize the reflection loss and consequently reduce the difficulties we are now experiencing.

The results obtained from our permanent installations have been most gratifying in every respect.

Our experience with radio communication has been confined to construction work only and for this class of work the telegraph has proven more satisfactory as numerals are difficult to transmit by phone and if not written are apt to be forgotten or misunderstood. As the majority of construction communication refers to material being ordered, traced, requisition numbers, etc., telegraphy with its written message is preferable.

By employing first-class operators we are not only able to handle a great volume of business but to insure accuracy.

The "space" radio telephone or "carrier current" telephone will undoubtedly prove more satisfactory than the telegraph for dispatching and operating purposes.

*Electrical World, Aug. 6, 1921.

"Carrier Current" Communication As Applied to Power Transmission Lines

During the last few years considerable research work has been carried out by several of the power companies and electrical manufacturers in connection with the application of "carrier current" radio to power transmission lines. These investigations have brought out some very interesting features of this means of communication, which are treated briefly in the following data:

The Great Western Power Company is now making use of a "carrier current" system in its Oakland-Big Bend transmission line, a brief description of which follows by C. F. Benham:—

"Directed Radio" Telephone Communication System:—Telephony has been adopted as the simplest to operate—and of sufficient reliability.

The system is in use primarily as a regular means of communication between the dispatching organization and the generating stations, with an early extension planned to include the principal transmission substations.

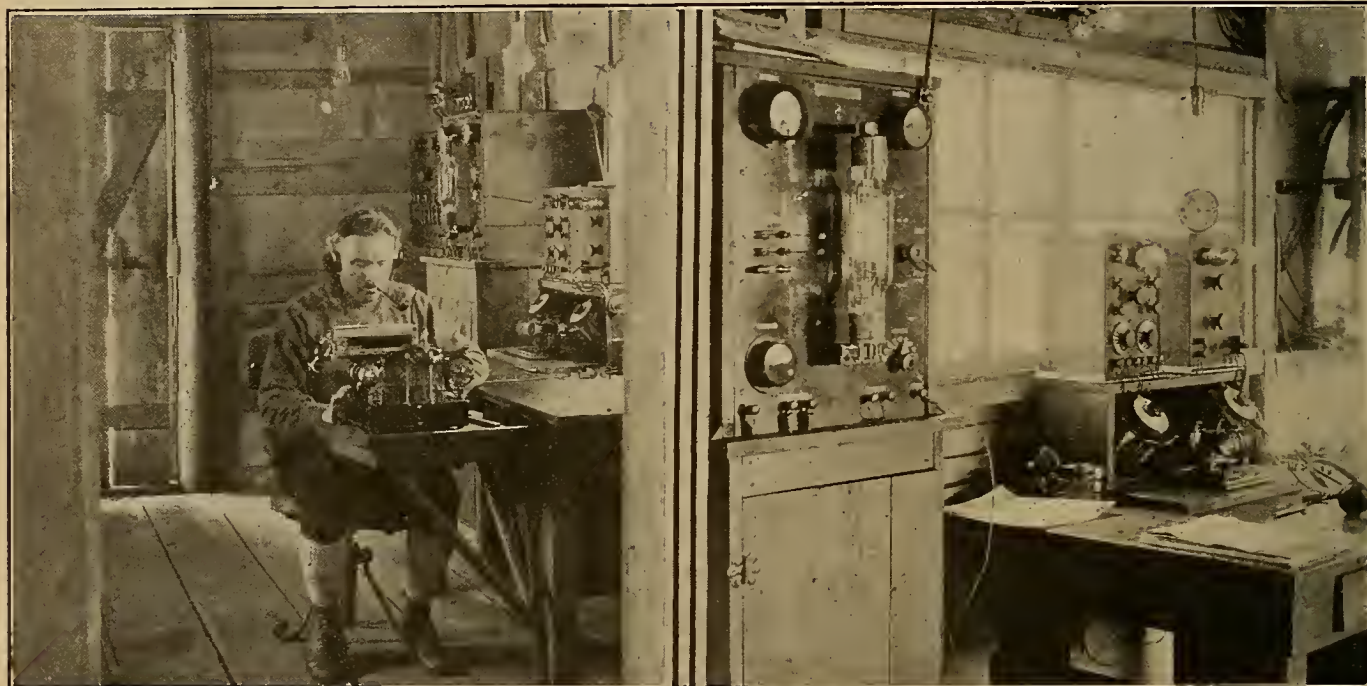
the first two towers of the 165-kv. line and directly under the line conductors. A tap from about the center is brought down to the power house, which is directly below. The distance is about 900 ft. here, as at Big Bend. No counterpoise is used—the direct ground being satisfactory.

Various wave lengths have been used successfully, but the best results are being obtained at present between 5,000 and 6,000 meters.

Transmitting Equipment:—The vacuum tube system is used for telephone. Small power tubes (50-watt) have been used with fair success—but in order to have a system that would "punch through" severe interference we have adopted 250-watt tubes as our standard, using one or in some cases two for the oscillator with a 250-watt modulator tube and a 50-watt tube for voice amplification.

A double unit motor-generator set provides 2,000 volts for the plate circuit of the oscillator tubes and 1,000 volts on the modulator tube. A 48-volt dry battery is used for the voice amplifier tube.

Filaments are lighted by a.c. from the regular supply



Operating room at Camp 61 of the Southern California Edison Company high up in the Sierra Nevadas (left) and transmitter and receiver at the same camp (right).

Incidentally, the system will probably be in considerable use as a means of communication between the construction force on an imminent generating plant extension and the general office—with one ordinary wire telephone link between the dispatcher's office and the general office.

Coupling System:—The transmission system consists of one double circuit 100-kv. line and one single circuit 165-kv. line paralleling each other on the same right-of-way over the greater part of the distance from the terminal substation at Oakland to the nearest generating plant (Big Bend), some 150 miles, with a 40-mile extension of the 165-kv. line from Big Bend to the more remote plant at Caribou.

For coupling we have employed an antenna strung on the line towers, using a somewhat different placing at the various stations, depending on the topography. At the terminal station we have spanned between the substation and the last two towers of the 100-kv. line—a distance of about 1,800 ft.—with the antenna in the plane of the center conductors. At Big Bend the same general scheme is followed except that a short span of the 165-kv. line is paralleled as well. At Caribou a span is strung across the canyon between

or from a d.c. motor-driven set in emergencies. The d.c. is obtained from the station switchboard control batteries, which also drive the motor of the main 2,000-volt sets and hence the communication system is not affected by operating troubles.

Receiving Equipment:—A standard regenerative type receiving set is used with ordinarily two stages of audio frequency amplification. A loud speaker is multiplied with the usual head phones, and with the receiving set always cut in, serves also as a signaling system. Since there is always an operator on hand no other system has been found necessary; though if there is no immediate response to a call a code signal of considerable volume can be given by means of a microphone transmitter held in front of the loud speaker—connected in the circuit and producing the well known howling effect one gets by placing the receiver of the ordinary phone against the transmitter.

The same antenna is used for sending and receiving with a magnetically operated throw over switch.

Conditions Affecting Operation:—Tests have been made with both of the 100-kv. circuits open at Big Bend and at

Sacramento, which is about half way between Big Bend and Oakland. Also these circuits were grounded at several points. Further tests have been made with various sections of the lines cut out and grounded, but on no occasion as yet with all circuits open simultaneously. In general, opening any of the lines weakens the transmission, but not beyond audibility.

No combinations with transformers in series have yet been tried.

Grounds on the transmission system conductors and in some cases on the primary distribution system feeders, cause some interference and the radio has turned out to be a good "trouble shooter" in consequence—as it indicates trouble before it shows up in any other way on our delta system. Serious grounds are quickly eliminated and cause no extended interference.

But slight atmospheric interference is experienced and only on a very few occasions has it been serious.

Interference from other stations is very rare—though an occasional high power telegraph station is picked up. With the particular wave length chosen and the sharp tuning possible with the receiving sets we use, we have been able to eliminate this.

No 60-cycle interference is experienced whatever.

The results have been very satisfactory and the system is used regularly in place of the private wire phone which was the only method previously available. It has given much better communication than the wire phone, especially over the longer distances—and has proven subject to much less interference.

The Pacific Gas & Electric Company is at this time just completing an installation of a "carrier current" radio communication system on its 220-kv. Pit River transmission line, which is described by E. A. Crellin in the following paragraphs:

The Pacific Gas & Electric Company is now installing and will have in operation about the first of April a "carrier current" radio telephone and telegraph system between the Vaca-Dixon Substation and Pit River Power House No. 1. This system utilizes the twin circuit 220,000-volt transmission lines between the two points for a conducting medium, a total distance of 202 miles, and will be for the sole purpose of directing the operation of the two stations both under normal and emergency conditions. Wire communication is now carried on between the two points but only in a very indirect route requiring several relays and of necessity subject to error and delay.

The system is coupled to the transmission line through a single wire antenna about 1,800 ft. long. This wire is attached to the twin vertical circuit transmission towers at a point on the center line of the tower and at the elevation of the middle crossarm. Six standard 10-in. suspension insulator units are used for dead ending and supporting the antenna. The main station ground system is also used as a ground for the radio equipment. No counterpoise is used. The wave length to be used has not yet been determined and will depend upon the constants of the system and outside interference. It is intended to use not less than 5,000 meters and as much above that up to 25,000 meters as best operating conditions will permit.

The transmitting equipment is the regular vacuum tube telephone transmission equipment similar to that used by the high powered broadcasting stations. Four 250-watt and one 50-watt Radio Corporation of America Radiatron tubes are employed, two of the tubes being used as oscillators and two as modulators with the 50-watt tube as a speech amplifier. The plates of the 250-watt tubes are supplied with a potential of 2,000 volts d.c. from a 2-kw. generator. This generator has two commutators, each supplying 1,000 volts d.c. and a tap is taken off to supply 1,000 volts d.c. potential to the

plate of the 50-watt tube. Mounted on the same shaft with the 2,000-volt generator is a 1½-kw., 125-volt exciter which also has slip rings for supplying 88-volt, 30-cycle a.c. This 88-volt a.c. is stepped down to 11 volts through a special 800-watt transformer and is used for lighting the filaments of the 250-watt and 50-watt tubes. The generator and exciter are driven by a direct connected 6¼-hp., 115-volt d.c. shunt wound motor. This motor derives its energy from the main station storage battery which is unusually large in order to handle the 220,000-volt oil circuit breakers. Normally the battery floats on the charging set and a contactor has been installed in connection with the automatic motor starter which short circuits a portion of the charging generator field rheostat and permits a rise in generator voltage to compensate for the extra load of the radio motor-generator set. Thus under normal conditions of operation no drain is placed on the storage battery. An automatic motor starter is used for control of the motor-generator set, the starting and stopping of the set being accomplished by taking the telephone receiver off or putting it on the hook. The motor-generator set and special 88/12-6-volt transformer were furnished by the General Electric Company.

The receiving equipment consists of a Colin B. Kennedy Corporation Type 110 Universal Receiver which has been modified to make it a non-regenerative receiver, and a Western Electric No. 10-A loud speaking outfit using two stages of audio-frequency amplification.

Calling is accomplished by mounting a calling microphone in the horn of the loud speaker which, when the calling circuit is completed, will oscillate and howl in much the same manner that the ordinary telephone will howl when the receiver is placed against the transmitter. This gives a very loud note whose pitch will depend upon the natural period of oscillation of the diaphragms and which is clearly audible in all parts of the station. Ordinarily, it is not necessary to use the calling system as the receivers are always in service and the operator near the set so that the loud speaker simply talks at him and he starts up his set and talks back. The system is arranged for a simplex operation and all that is necessary is to operate a small telephone switch which energizes a contactor to connect either the transmitting or receiving set to the antenna, thus permitting talking or listening.

The "carrier current" radio system has not yet been put into operation and it is therefore too early to give data on the effect of varying line conditions. We have no doubt as to its dependability under practically all conditions even with one of the 220-kv. lines down and grounded, and expect to effect communication between the stations under conditions when the wire lines will be out of service.

The Southern California Edison Company (by R. B. Ashbrook):—This company has been very much interested in development of "carrier current" telephone communication, but at present has none in operation.

We have two 50-watt sets for experimental purposes, but deliveries on the generators have been delayed and have not had the opportunity to put them in operation.

There is undoubtedly a great field for this means of communication by power companies and will supplant wire communication in a great number of instances.

The Southern Sierras Power Company carried on a series of tests in connection with "carrier current" radio during 1921-2, and the results of these "carrier current" radio tests, conducted on the 80-kv. Imperial line between San Bernardino and El Centro, and also on 33-kv. system out of San Bernardino substation, are described by M. L. Baden:

During some of our "space" radio testing in the fall of 1916 between Control Station, at Bishop, California, and Rush Creek Power House (a distance of about 60 miles), our attention was attracted to the marked increase of efficiency

of radio transmission when our transmitting and receiving antennae were in a certain relation to the transmission line connecting these two points. A few tests were made at that time to satisfy ourselves of the above point, but the nearness of winter, followed by the entry of this country into the world war in the spring of 1917, caused a lapse of such tests on this company's system until the summer of 1921, when an appropriation covering certain radio tests between San Bernardino Sub and Imperial Valley points permitted us to resume our investigations along the line mentioned above.

Transmitting Equipment at San Bernardino Sub:—

Antenna: In the early part of September (1921) a four-wire antenna, approximately 300 ft. long, was installed between two of the steel poles of the Imperial line, near its take-off from the San Bernardino Sub, about ten feet below the lower conductors of the 80-kv. Imperial circuit.

Ground: A suitable ground was obtained by tying onto several old well pipes located near the transmitting station.

Transmitter: The transmitter consisted of a 2-kva. plain spark-type set remotely controlled from the operator's desk in the substation. (The maximum input used, however, was 1 kva.)

Receiving Equipment: A three-tube non-regenerative set was made up, for the most part from equipment on hand, and arranged for portability.

Banning Reception Test:—On September 17 several reception tests were made with San Bernardino Sub from a point on the Imperial line about one-half mile east of Banning Sub (45 miles from San Bernardino). The results obtained were very satisfactory. The antenna used for these reception tests consisted of a No. 10 copper wire, approximately 400 ft. long, stretched between two of the Imperial line poles. The ground used for best reception purposes was a convenient water pipe, but good results were obtained by

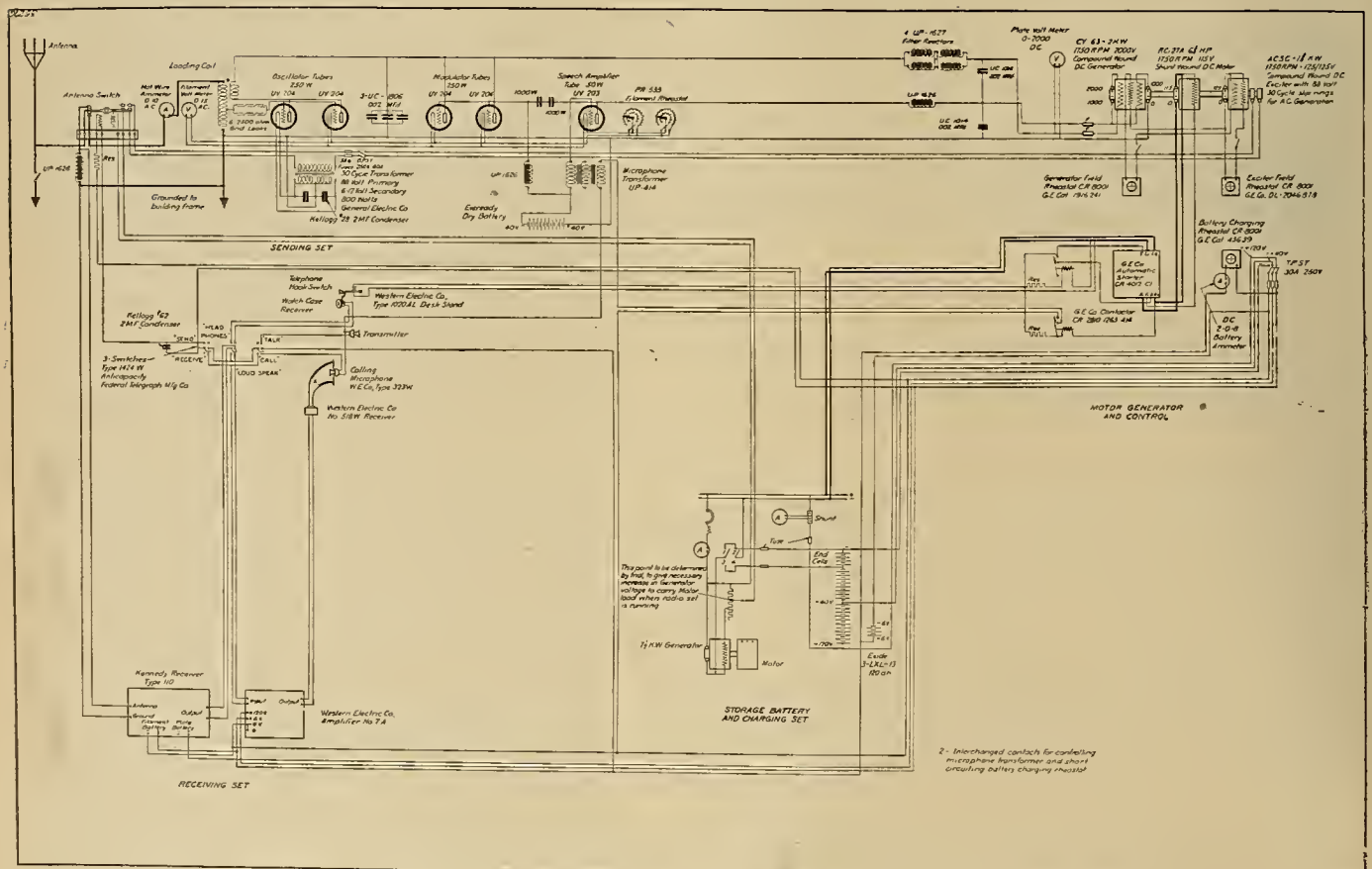
merely driving a 24-in. bolt into the hard ground near the road and also by using the auto body for a capacity ground.

Coachella Reception Test: On September 22, reception tests with San Bernardino Sub were made at Coachella Sub (90 miles from San Bernardino). These tests proved very satisfactory, signal intensity being ample, using detector and one amplifier tube.

El Centro Reception Tests:—Ordinary Day Tests at Terminal Station: On September 23 several daylight reception tests were made between San Bernardino Sub and the Terminal Station at El Centro (170 miles), under ordinary operating conditions. These tests also proved very satisfactory, ample signal intensity being obtained with two tubes to permit easy reception with the radio receiver located on the operator's desk in the noisy Terminal Station room. Satisfactory reception results were obtainable using but one tube, but due to the noise of the synchronous condenser two tubes were desirable. There appeared to be little or no difference in intensity between Coachella reception and that at Terminal Station.

Tests on 15-kv. system out of Terminal Station: It was then desired to learn whether our radio frequency energy from the San Bernardino transmitter was getting through the transformer windings at Terminal Station into the 15-kv. system out of that station. Consequently it was decided to make a test under the 15-kv. Dixieland circuit near Seeley. Several tests were made at this point using all three tubes, but no trace of our San Bernardino transmitter was obtained, which was pretty conclusive evidence as to what could be expected should we try to work through transformer windings.

Night Tests at Terminal Station, under Special Operating Conditions: Having the desire to learn how our radio transmission efficiency would be affected by opening the Imperial Valley line at some point between San Bernardino



Wiring diagram of the carrier current system of the Pacific Gas & Electric Company at Vaca Substation.

and El Centro, arrangements were made to open the Imperial line at Calipatria Sub at 1:30 a.m. on September 24 and carry the Imperial Valley load with the Calipatria Sub transformers for the short period of our tests. Several tests were made with San Bernardino prior to opening the Calipatria switch, all of which were normal, but as soon as the switch was opened all radio communication was lost. Upon closing the switch again our radio communication immediately became normal.

This test brought to light an obstacle which it was evident would have to be overcome to permit the completely satisfactory application of "carrier current" radio to our transmission system as a means of thoroughly reliable communication.

Elsinore Tests:—After giving some thought to the above mentioned obstacle it was decided to make some tests using what we termed a "bypass antenna" installed at the point where there was an open line switch; this "bypass antenna" serving as a "bypass" for the communication energy past the open switch.

Consequently, such a "bypass antenna" was installed at a line sectionalizing switch in the 33-kv. Corona-Elsinore line near Elsinore and several tests made which indicated that the "bypass antenna" functioned as desired. Also, in these Elsinore tests we found that our receiving station was near enough to the San Bernardino transmitter (about 45 miles) so that it was possible to get good reception with the line sectionalizing switch open without the "bypass antenna" in operation.

Having reached the limit of the appropriation set aside for this work at this juncture of the tests, it was necessary to suspend the work until further appropriations can be arranged for. At that time it is hoped to carry on further tests with the "bypass antenna" used in connection with a transmission line 200 miles long or over, which will enable us to determine the approximate efficiency of such an antenna.

Conclusions:—The above tests have shown us that the efficiency of radio transmission between two points on a transmission line is enormously increased by using the transmission line as a "carrier" for the radio communication.

It is apparently inadvisable to endeavor to communicate through transformers or open line switches, particularly on long lines (over 100 miles) without the aid of "bypass antennae."

The reception intensity was so great using the "carrier current" radio system over 170 miles of line that the receiver was used with perfect satisfaction in an open room within twenty feet of a 2,000-kva. synchronous condenser in operation.

The system was found to be almost entirely free from outside interference and from static. The fundamental and several harmonic notes from the transmission lines were always present, but with the receiving antenna properly arranged gave no appreciable interference."

The General Electric Company has been very active in the development of "carrier current" radio equipment such as to meet the requirements of the power companies, and at the present time is manufacturing standard sets of 50-watt and 250-watt output capacity. The price of the 50-watt set complete with receiver and all equipment necessary to constitute one complete station is approximately \$2,000, and that of the 250-watt set about \$6,000.

The 50-watt set is described in detail in G. E. Instruction Book No. 86948, but data on the 250-watt set is not available at this time.

Radio Broadcasting Service to Public by Power Companies

"Space" Radio Broadcasting by Power Companies:—Broadcasting of music and subjects of interest to its consumers, by "space" type radio broadcasting stations, is being

accomplished by several of the power companies of this country, but so far as is known at this time, is not being used to any very great extent.

"Carrier Current" Radio Broadcasting by Power Companies:—Broadcasting over the power distribution systems has been successfully accomplished in several instances, particularly by the Wired Radio Co., Inc., over the electric distribution system of the Potomac Electric Power Company in Washington, D. C., and vicinity. In one of its recent demonstrations a 500-watt radiophone transmitter of somewhat special design was installed in the Georgetown substation of the Potomac company, and its output transmitted to the 2,300-volt distribution lines through high voltage condensers. A number of receiving sets were plugged into lamp sockets, connected to the 115-volt lines in widely separated districts of Maryland and the District of Columbia, and good reception was obtained with simple crystal receiving sets.

The transmitting capacity required was very much less than anticipated, tests indicating that from .5 to 2 watts per square mile of electric lighting network would probably be sufficient to satisfy the requirements.

This system of broadcasting to the public may be applied to advantage in some localities, but it is very doubtful if it will ever be generally used by power companies, since the many "space" broadcasting stations offer such a variety of program that the average "radio fan" will not be content to confine his listening to the program of a single "carrier current" broadcasting station.

Carrier Current Relay Control of Lighting Circuit:—On June 8, 1922, the Lynn, Mass., representatives of the Associated Edison Companies witnessed a demonstration in which superimposed high frequency current was used for the remote control of relays operating a street lighting circuit. The demonstration, carried on by the General Electric Company, was not conducted with apparatus designed for commercial application, but was intended merely to demonstrate the possibilities of such a system as applied to the requirements of power companies.

From the plant of the Lynn Gas & Electric Company, the carrier current system successfully controlled two circuits at Little Nahant, four miles distant, one of these circuits being used at the same time as the carrier guide. The circuit used as a carrier guide is a 3-phase, 4,400-volt house-lighting primary employing a grounded neutral. One phase is tapped off and supplies Little Nahant through two transformers, the average night load of the line being about 15 amp. The carrier current was put upon this line at the central station and running through 6,300 ft. of standard underground lead cable and then by pole line about five miles to Nahant, was taken off at the primary of one of the transformers to operate the control relays. These relays were made to operate eighteen incandescent and two arc lamps on that circuit.

Carrier current brought over the same circuit was arranged to operate relays on a second circuit controlling two 1,000-watt searchlights, two 500-watt flood lights and a pendant lantern. The latter circuit was a 4,000-volt, 4-amp. rectifier series street lighting circuit.

These two circuits were particularly suitable for this demonstration inasmuch as the controlled lamps were plainly visible from the plant of the Lynn Gas & Electric Company.

The carrier current equipment at the electric company's plant consisted of the 50-watt high frequency vacuum tube generator, shown on the accompanying photographs. Power obtained directly from the 110-volt, 60-cycle supply was converted into the high frequency power without the use of a motor generator. The equipment was arranged so that by means of a switch, any one of two or three predetermined frequencies could be adjusted for. The distant lights were turned on and off by setting the switch at different frequen-

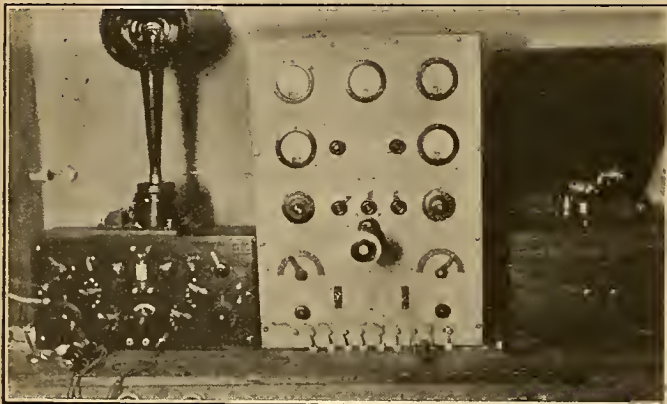
cies and holding the operating button closed until there was visual indication across country of the operation being complete, about five seconds being necessary for this. In an equipment designed for commercial operation, some sort of positive indicator would be included.

Legislation Concerning Radio Communication of Interest to Power Companies

"Space" Radio Legislation:—"Space" radio transmitting stations used in central station operation, but not open to public use, are required to operate under a "Limited Commercial License" issued by the Department of Commerce and the operators of such stations must hold a "Commercial Second Grade" Operator's License (or higher). This license requires that the holder thereof will have successfully passed an examination in—

- a.—The adjustment, operation and care of apparatus.
- b.—Transmitting and receiving by ear, at a speed of not less than 12 words per minute in Continental Morse.
- c.—Use and care of storage batteries.
- d.—Knowledge of the international radio regulations and the requirements of the Acts of Congress to regulate radio communication.

If such stations interfere with the reception of messages from ship stations they are classed as "coastal" stations and are required to be able to transmit on wave lengths of 300 and 600 meters for the purpose of transmitting or relaying



The experimental radio telephone outfit used by the San Joaquin Light & Power Corporation in conducting their tests.

distress messages or signals and messages relating thereto, if necessary. The operators of such "coastal" stations are required, during the hours the station is in operation, to "listen in" at intervals of not less than 15 minutes and for a period of not less than 2 minutes, with the receiving apparatus tuned to receive the wave length, for the purpose of determining if any distress signals or messages are being sent and to determine if the transmitting operations of the "listening in" station are causing interference with other radio communication.

Copies of the Radio Laws and Regulations may be obtained from the Supt. of Documents, Washington, D. C., for fifteen cents.

"Carrier Current" Radio Legislation:—In neither the existing laws nor in the proposed legislation are there any provisions requiring the licensing of "carrier current" transmitting stations. In this respect the Department of Commerce has taken the stand that until interference with bona fide interstate or international radio communication is reported from "carrier current" operation, no consideration will be given to this method of communication. It is probable, however, that specific regulations covering this method of

communication may be drafted at some time in the future, since the locations of some of the "carrier current" radio stations may be such with respect to commercial or Government radio stations as to cause interference under certain operating conditions of the "carrier current" transmitting stations.

Summary of Advantages and Disadvantages of Different Types of Communication Systems

Wire Communication

Advantages:

1. Simplicity of operation.
2. Permits simple duplex communication.
3. Operation independent of topography.
4. Privacy of communication.
5. No station license required.
6. Calling system available.

Disadvantages:

1. Service interruptions from line failures, particularly during severe storms.
2. Service interruptions due to trouble on power line, which the communication line closely parallels, causing intense inductive interference.
3. Repairs of line failures often very slowly and difficultly effected, due to remoteness.

"Space" Radio Communication

Advantages:

1. Entirely independent of all interconnecting lines and their possible failures.
2. Equipment all located at points of operation and thus always readily accessible for repairs when necessary.
3. Usually affords means of communication with commercial or government radio stations in an emergency.

Disadvantages:

1. Transmission efficiency subject to intervening topographic conditions.
2. Somewhat subject to outside interference from other stations in some locations.
3. Subject to severe atmospheric interference in some localities for certain periods of season.
4. Duplex communication expensive and somewhat complicated.
5. Lack of privacy of communication.
6. Station must be licensed and operated by licensed operator.

"Carrier Current" Radio

Advantages:

1. Independent of intervening topography.
2. Much less power required to cover a given distance than "space" radio.
3. Greater freedom from external disturbances, such as static, and interference from other radio stations.
4. Privacy of communication.
5. Station license and licensed operator not required.
6. Call bell system available, not necessitating operator to be listening in to receive calls.
7. Expensive antenna supports and elaborate ground system not required.
8. Little interference created in outside communication systems.
9. Operator may listen to power line conditions.

Disadvantages:

1. Communication subject to interruption when "carrier" line conductors all become severed or grounded due to line failure.
2. Necessary to "bypass" line switches, auto transformers, etc.
3. Necessitates use of large transmitter when applied to a "carrier" system composed of a large network of lines or to a transmission line with a very large number of tap feeders or substations.
4. Duplex communication rather complicated and expensive at the present time when applied to telephony.
5. Somewhat more subject to interference from transmission line disturbances, such as discharging insulators, arcing grounds, etc., than "space" radio.

General Conclusions

Wired Communication, for ordinary routine and load dispatching communication requirements, is usually to be preferred to radio, mainly on account of its present high degree of perfected simplicity. However, it should be supplemented by some means of reliable auxiliary communication, such as "space" radio or "carrier current" radio in order to be of the maximum value to power companies, in cases where almost uninterrupted communication is a requisite.

"Space" radio functions very satisfactorily in such instances under many conditions, and where the distances to be spanned do not greatly exceed 100 miles of average topography and the stations are not located near a large commercial or government station, reliable communication service can be effected at practically all times, without prohibitive installation costs.

Before making "space" radio communication installations in a mountainous country, careful preliminary tests

should be made to determine approximate size of transmitter actually required to guarantee reliable communication under the existing topographic conditions. It is quite a well known fact that "space" radio transmission efficiency varies enormously in mountainous territory, each case usually being a special case.

Also, careful consideration should be given to the choice of proper wave lengths to reduce outside interference to a minimum.

The fact that the stations required to be licensed and operated only by licensed operators is a slight objection, in some respects, but this feature usually insures a competent man, who can be trained for other duties in addition to those of being a radio operator.

"Carrier current" radio—by making use of the transmission line conductors as a "carrier" for the radio frequency communication energy, besides effecting a marked saving in transmitter energy consumption, during normal operating conditions—is not affected by the intervening topographic nature of the country through which communication is being carried on. This makes the "carrier current" system particularly desirable for application to transmission lines through mountainous sections, where the efficiency of "space" transmission is usually very severely attenuated.

The "carrier" type installation, however, cannot be expected to effect communication properly under certain conditions, namely:

- 1.—When all conductors of the "carrier" transmission line are grounded.
- 2.—When all conductors of the "carrier" line are severed.
- 3.—When "carrier" line sectionalizing switches are opened unless such switches are properly "bypassed" by some type of "bypassing" antenna or other device.

In the event of two or more transmission circuits being carried along the same tower line or right-of-way, and being used as a part of the "carrier" system, the chances for all conductors being grounded or severed are somewhat remote. However, in the case of the single circuit transmission line this condition is apt to occur, but the possibilities for continuous operation are much in favor of the "carrier" system, even in this case of application, as compared to the wire communication line, when we consider that a "short," "ground," or "break" of either of the two conductors of the "wire line" will cause an interruption to communication service.

Considerable has been reported in the past relative to the ability of the "carrier current" radio system to effect communication through open "carrier" line switches, past severe breaks in the line and through solidly grounded lines. It is rather the conservative opinion of this sub-committee that such cases are misleading, since it is believed that if they are carefully analyzed it will be found in each case that communication was really effected by "space" transmission, if the distance between the two stations was comparatively short; or else there has been a means of "bypassing" the "carrier" radio energy past the fault, that was not realized at the time of the incident. For example, there may be a twin circuit and single circuit transmission line connecting two points of operation separated a hundred miles or more. All circuits leave the two stations from the same side of the buildings, but the "carrier" antenna is applied to the towers of the twin circuit line, with the single circuit line possibly a hundred feet away. The route of the single circuit line may or may not follow the right-of-way of the twin line. If line sectionalizing switches opening both circuits of the twin lines are operated and tests made, the impression might be gained that the "carrier" system was "jumping" the switch, whereas, in reality it is being routed over the single circuit line; the audibility being appreciably less on account of separation of "carrier" antenna from single line. Similar reasoning will apply in the case of solid grounds on all conductors of the twin circuit line, or even in the extreme case

of all conductors of the twin line being severed and grounded.

Also, a nearby communication or low tension power line may possibly serve as a "bypass" if it parallels the "carrier" line at the point of open switches or severed conductors.

Actual tests have been made by some* of the power companies which prove that the antenna of the "carrier" system is a fairly efficient "space" radiator, even when being used as a "carrier" antenna and located very near the transmission line conductors. This fact may have been overlooked during certain "carrier" tests with open line switches, grounds, etc., and reported reception though such faults may have been accomplished in reality by "space" transmission.

"Carrier current" radio functions well, but its efficiency should not be overestimated, and its advantages and disadvantages should be relatively weighed, and compared with those of the other means of communication before an actual installation is considered.

Combined "Space"- "Carrier" Radio Communication System:—It would appear then, that the ideal auxiliary communication system would be a combination of the "space" and "carrier current" radio systems, in most cases. The logical use of such a combined installation would be to utilize the "carrier" system at all possible times; (for reasons apparent from reviewing the "advantages" under "carrier current" radio of the summary), then, in the event of failure of the "carrier" system due to severe transmission line trouble, "throw over" to the "space" radio antenna, increase power output of transmitter, re-tune transmitter if necessary and continue operations.

Naturally the size of the transmitter in this case must be several times what it would be for straight "carrier" service, particularly in mountainous sections. In some cases intermediate stations could be utilized to relay the communication through if necessary, thereby permitting the size of transmitter to be smaller than they would otherwise necessarily have to be to guarantee dependable space transmission over comparatively long distances.

The principal disadvantages of this "combined system" would be that under the present** regulations of the Department of Commerce, stations of this character utilizing a space antenna would be subject to the rules and regulations applying to a limited commercial radio station. This would necessitate the station being licensed and operated by a licensed operator.

Forecast:—With the engineering resources of the foremost electrical manufacturers of our country working in conjunction with the power companies towards the development and perfection of radio communication methods and equipment applicable to power company needs, as they are now doing, extensive progress can be anticipated. Also, many of the power companies are carrying on their own research investigations along these lines and meeting with considerable success. Amalgamating the efforts of the combined working forces then, it can conservatively be expected that a great stride towards the perfection of a practicable and reliable means of additional communication, suitable for the urgent need of power companies, will no doubt be realized during the ensuing year.

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2. Report of Shawinigan Water & Power Company of Montreal on "Wireless Telephone Installation," by A. S. Remison, Tel. Engr. See Reference Appendix, Item 1 of 1922-3, Report Sub-Committee on Communication IV, P. C. E. A.
3. "High Frequency Telephone for Power Plant," by Dr. Gewecke, Chief Eng. of The Society of Wireless Telegraphic, Berlin. See Reference Appendix, Item 2 of 1922-3, Report Sub-Committee on Communication, P. C. E. A.

*Tests by Southern Sierras Power Company, 1921-2.

**Refer to "space" radio legislation.

Problems in Steam Plant Operation

By E. A. Quinn*

THREE new large turbo-generator installations have been reported to the Committee during the year; one 12,500 kva., one 15,000 kva. and one 17,500 kva. All three of these machines are reported as operating satisfactorily.

Very little blade trouble was experienced among member companies during the year. One member reported an average efficient life of turbine blading as five years. One plant stated that its blading troubles had always been due to mechanical injury, and another cited a failure due to sudden overload. It appears that blading failures are less frequent now than they were several years ago. There is some tendency toward higher steam pressures and temperatures but pressure of 260 lb. and 560-deg. temperatures are far below eastern practice.

Amount of condensing surface reported per kilowatt varies from 1.8 sq. ft. to 2.4 sq. ft. and amount of circulating water per kilowatt, 1.75 gal. per minute to 2.28 gal. per minute. Where sea water is used for condensing the average vacuum reported was 28 in. Where towers or ponds were used the average was approximately 27.5 in.

Some of the member companies who have extensive hydroelectric plants use their generators as synchronous condensers.

The practice among turbine builders today seems to be to make the prime mover powerful enough to carry full load on the generator at unity power factor. There was a tendency about eight years ago to make the turbine a little small for any overload capacity.

There are several eastern plants that are using very high steam pressures on the main turbine and bleeding at about 100-lb. pressure for the operation of auxiliaries. Others are using all electric driven auxiliaries and bleeding the main turbine for heating. One large central station reports that the steam consumption of its main turbines was reduced by extracting at the pressure stages because of the relief it gave to the low pressure stages and the condensers. This extraction idea seems to have great possibilities as one of the great problems in turbine design is the handling of the large volumes and tremendous velocities of the low pressure stuff.

One manufacturer reports that they have under construction a turbine designed to operate with a steam pressure of from 1,000 to 1,200 lb. gage, 750° F. total temperature. This machine when exhausting against a back pressure of 250 lb. will develop approximately 4,000 kw. The exhaust steam is to be reheated and delivered to the steam mains in an existing station.

The general preference among members is for steam driven auxiliaries because of their reliability. Some express confidence in electric auxiliaries where there is a house turbine. The dual drive idea seems to be gaining in favor,

IN its report the Prime Movers Committee outlines practical suggestions as to types of apparatus and methods of operation which have proved successful in Western power plant practice, and recommends that a special study be given to an operating code.

both for reliability and heat balance control. Two plants report a separate electric driven spare for two units in addition to steam drive.

The steam jet air pump has become a favorite on the Coast because of its low maintenance cost. Some of the eastern plants are using primary steam jets discharging into dry vacuum pumps. This is said to

make considerable saving in power and about the same installation cost as straight dry vacuum pumps.

Our members seem to have no fears of reduction gears in connection with auxiliaries, although some of them have given considerable trouble.

The amount of power consumed by auxiliaries is reported to be from 2.5 per cent to 13.5 per cent of that generated by the main unit. Ten per cent seems to be an average figure. Where there is an abundant supply of circulating water at low temperature the power used by the auxiliaries should be around 5 per cent.

The amount of boiler make-up used is from 2 per cent to 10 per cent. In plants that are equipped for maintaining a heat balance the make-up is 2 per cent to 5 per cent.

The sub-committee on lubrication has obtained data from six power plants, the principal features of the equipment of which are given in table No. 1. It will be noted that the information applied to turbines ranging in capacity from 3,000 kw. to 20,000 kw., of both horizontal and vertical types. Two of the plants use an eastern paraffin base oil, and the other four use a California asphaltum base oil.

Table No. 2 gives a comparison of bases and colors of the new and used oil at the six stations.

Table No. 2
Comparison of Bases and Colors of New and Used Oil

| Plant..... | I | II | III | IV | V | VI |
|-----------------|--------------------------------|---------------|---------------------------------|------------|--|------------|
| Base..... | Asph. 90% Par. 10% | Paraffin | Asphal. | Asphal. | Asphal. | Asphal. |
| Trade Name..... | Oil No. 1 90% Oil No. 2 10% | No. 1 | No. 2 | No. 2 | No. 2 | No. 2 |
| Quality..... | Medium | Light | Light 50% Heavy 50% | Heavy | Medium | Light |
| New Oil..... | Amber | Pale orange | L. Lt. Yel. H. Reddish tinge | Amber | Pale green with yellow tint | Medium red |
| Used Oil..... | ..... | Reddish tinge | Dark Choc. to black | Dark brown | Nos. 1 & 2 dark, cloudy brown No. 3 clear reddish brown | Dark red |

The color of oil is a matter of considerable importance, due to the fact that the color is changed by oxidation. It is therefore very desirable to adopt some sort of a standard scale or code for determining the color of oils so as to bring about uniformity of reports. Special care should be taken to prevent the coloring of oil by accidental means, such as dust, remnants of packing, fringes of gaskets. The use of red rubber in manhole joints, gaskets, pipe flanges, etc., should be avoided as a small amount of such material readily dissolves in the oil and may completely change its color. Moreover, if particles of this material break off, they may plug up the strainers and do considerable damage. The color of the oil

*Prime Movers' Committee: E. A. Quinn, chairman; R. J. C. Wood, J. W. Andree, O. Hilleary, S. J. Kraps, R. C. Denny, A. Y. Meudell, R. A. Wallingford, R. E. Thompson, A. J. Turner, E. E. Valk, M. V. Watson, J. G. Rollow, P. M. Robinson, D. D. Morgan, C. H. Benham, G. H. Bragg, G. Clingwald, F. O. Dolson, V. W. Hoxie, R. S. Masson, R. F. Monges, R. E. Leefeld, S. J. Lisberger, C. E. Steinbeck, R. C. Powell, C. H. Delaney.

Table No. 1

| PLANT | I | | | II | | | | | III | | | | IV | V | | | VI | | |
|---|----------------------|--------|--------|--|--------|--------|--------|--------|--|--------|--------|--------|-------------|---|--------|--------|---|--------|--------|
| | Tur. 1 | Tur. 2 | Tur. 3 | Tur. 1 | Tur. 2 | Tur. 3 | Tur. 4 | Tur. 5 | Tur. 4 | Tur. 5 | Tur. 6 | Tur. 7 | 10000 | Tur. 1 | Tur. 2 | Tur. 3 | Tur. 1 | Tur. 2 | Tur. 3 |
| Size of Turbine Kw..... | 12000 | 15000 | 20000 | 3000 | 3600 | 5000 | 10000 | 17500 | 15000 | 15000 | 12500 | 15000 | 10000 | 9000 | 12000 | 12500 | 9000 | 9000 | 9000 |
| Make of Turbine..... | Curtis | Curtis | Curtis | West. | West. | West. | G. E. | G. E. | Curtis | Curtis | Curtis | Curtis | Thalmers Co | G. F. | G. E. | G. E. | G. E. | G. E. | G. E. |
| Speed of Turbine r.p.m..... | 750 | 750 | 750 | 1200 | 1200 | 1800 | 1800 | 1800 | 1800 | 1800 | 720 | 720 | 1800 | 720 | 720 | 1800 | 720 | 720 | 720 |
| Type, Vert. or Horizontal..... | Vert. | Vert. | Vert. | Horiz. | Horiz. | Horiz. | Horiz. | Horiz. | Horiz. | Vert. | Vert. | Vert. | Horiz. | Vert. | Vert. | Horiz. | Vert. | Vert. | Vert. |
| TURBINE OIL | | | | | | | | | | | | | | | | | | | |
| Trade Name of Lub. Oil..... | Nos. 2 and 3 Systems | | | Oil No. 1 | | | | | Oil No. 2 | | | | Oil No. 2 | Oil No. 2 | | | Oil No. 2 | | |
| | 90% Oil No. 1 | | | | | | | | | | | | | | | | | | |
| | 10% Oil No. 2 | | | | | | | | | | | | | | | | | | |
| By whom manufactured..... | Co. No. 1 | | | Oil No. 1 | | | | | Co. No. 2 | | | | Co. No. 2 | Co. No. 2 | | | Co. No. 2 | | |
| Quality of oil, Heavy, Med., Light..... | Medium | | | Light | | | | | Alternate shipments of heavy and light | | | | Heavy | Medium | | | Light | | |
| Base of oil, paraffin or asphaltum..... | Oil No. 1—Paraffin | | | Paraffin | | | | | Asphaltum | | | | Asphaltum | Asphaltum | | | Asphaltum | | |
| NEW OIL | | | | | | | | | | | | | | | | | | | |
| Specific Gravity at 60° F..... | 0.8680 (or 31.3B) | | | 30.5 B | | | | | LIGHT | | | | | 21.6B | | | .9192 | | |
| Flash Point Open..... | 385° F. | | | 415° F. | | | | | .9192 | | | | | 344 | | | 310° F. | | |
| Fire Point Open..... | 440° F. | | | 460° F. | | | | | 310° F. | | | | | 374 | | | 345° F. | | |
| Saybolt Viscosity at 104° F..... | 138 Sec. | | | 142 (at 100° F.) | | | | | 126 | | | | | 110 Sec. comp. with water at 15° C. | | | 126 | | |
| | | | | | | | | | 265 | | | | | 3.66 | | | | | |
| Saybolt Viscosity at 140° F..... | 75 | | | | | | | | 68 | | | | | 60 Sec. comp. with water at 15° C. | | | 68 | | |
| | | | | | | | | | 108 | | | | | 2.00 | | | | | |
| Color..... | Amber | | | Orange, pale | | | | | Light yellow to reddish green | | | | Amber | Pale green with yellow tint | | | Light yellow | | |
| Demulsibility in Water..... | | | | Good | | | | | | | | | | Not determined | | | | | |
| USED OIL | | | | | | | | | | | | | | | | | | | |
| Length of time oil was in service when tests were made..... | 1 yr. 3 months | | | Some new oil is added as needed to replace evaporation and to replace that drawn from the system for use on auxiliary machinery. | | | | | It is impossible to state, as new oil is added as necessary to make up losses. | | | | Sept. 19-22 | No. 3 tur. 2 | | | No. 2 turbine with make up oil extends over several yrs | | |
| Specific Gravity at 60° F..... | | | | 29.8 B | | | | | .9343 | | | | | .9278 | | | Spec. Gravity at 120° F. 24.5 Baume | | |
| Flash Point Open..... | 390° F. | | | 418° F. | | | | | 330° F. | | | | | 335° F. | | | | | |
| Fire Point Open..... | 440° F. | | | 465° F. | | | | | 370° F. | | | | 375° F. | 370 | | | | | |
| Saybolt Viscosity at 104° F..... | 160 Sec. | | | 143 (at 100° F.) | | | | | 281 | | | | | 147.3 sec. | | | 200.16 | | |
| Saybolt Viscosity at 140° F..... | 84 Sec. | | | | | | | | 105 | | | | | 67 | | | 86.8 | | |
| Color..... | | | | Reddish tinge | | | | | Dark chocolate to black | | | | Dark brown | Clear, reddish brown | | | Dark, cloudy brown | | |
| Demulsibility in water..... | 150 | | | Good (complete separation) | | | | | | | | | | Not determined | | | Two hours | | |
| Acidity..... | 0.55% | | | 0.21% | | | | | N/400 | | | | | None | | | Slight trace | | |
| How often oil is tested..... | Every three months | | | Daily for water | | | | | Monthly or oftener | | | | | As often as appearance requires | | | Daily | | |
| What method of testing is used..... | | | | Allow to settle in test tube | | | | | Centrifuge, titration and viscosimeter | | | | | Saybolt viscosimeter grad. cylinder for water | | | Viscosimeter grad. cyl. for water | | |

may be a determining indication of its condition. Thus at one station where the oil is a dark chocolate to black color, the oil and water do not separate without treatment. In another plant where the color is light the water readily separates from the oil. In another plant where the oil is slightly darker, it takes a somewhat longer time to separate.

The contamination of the oil by dust is a matter that is often overlooked and should be constantly borne in mind. To avoid this it is essential that oil tanks be covered. Exposure to the air should also be avoided as much as possible, as oxidation is the principal factor in breaking down the oil. Covering of tanks will aid in preventing the aeration of the oil.

In some cases the oil tends to vaporize at points of highest temperature, and where vents are provided and the vapor escapes to the atmosphere, there is a tendency for the oil to become devitalized by evaporation of the lighter constituents. It is advisable, therefore, to arrange vents so as to return the vapors to the oil at some point where it is cool enough to recondense them.

The presence of water in the oil is one of the principal causes of sludge, emulsion and deterioration. Water may get into the oil from the condensation of gland steam. This condensation may be contaminated with mineral salt or boiler compounds where boilers have a tendency to prime. Water may leak into the oil through leaks in cooler coils, unless the coolers are designed so that the oil pressure is greater than the water pressure. This should be done in all cases, and arrangements should be made for the observation of the water discharged from coolers to avoid losing oil in case of leaks. Water may also be formed chemically in the oil by oxidation from the air, and this chemical reaction may be assisted by the presence of dust and impurities. By keeping tanks properly covered, much of this difficulty will be avoided.

Table No. 3 gives a comparison of the amount of oil

in the different systems, the quantity of make-up oil, and the filtering capacity.

Table No. 3—Capacity of Lubricating Oil Systems

| Plant..... | I | II | III | IV | V | VI |
|---|------|--------|--------|------|------|--------|
| Oil in system, gals..... | 8750 | 1800 | 6050 | 800 | 3800 | 4650 |
| Capacity, return tanks, gals..... | 1795 | None | 7500 | .... | 4084 | 5825 |
| Make-up oil in 1 yr., gals..... | 6009 | .... | 7050 | .... | 1800 | 3000 |
| Make-up oil in per cent of total | 40% | .... | 116 % | .... | 41% | 51% |
| Oil filtering capacity per hour, gals..... | 2100 | 400 | 1000 | 600 | 800 | None |
| Systems independent or inter-connected..... | Ind. | Inter. | Inter. | Ind. | Ind. | Inter. |

In plants having more than one turbine there are two different types of systems, one in which the lubricating oil for all turbines is interconnected, the other in which each turbine has a separate lubrication system of its own. A separate system for each turbine appears to be the preferable arrangement. This permits the oil to have a rest whenever the turbine is shut down, whereas with the interconnected system the oil never gets a complete rest unless the entire plant is shut down. It is possible to localize trouble more easily in the case of the independent system, so that if the oil is contaminated, due to some local cause on one turbine, the difficulty will not be spread to the whole plant. It is desirable, however, to arrange interconnection between the different turbines for use in cases of emergency.

The present tendency among turbine manufacturers is to make each machine self-contained with the oil reservoir in the turbine base. This results in some cases in a somewhat limited oil capacity. Much larger oil storage capacity is required in the case of vertical turbines than in the case of horizontal machines, due to the fact that more oil is used in the step bearing, and generally throughout the vertical machine, than in the horizontal machine.

The quantity of make-up oil used per year varies greatly in different plants. In one case as much as 116 per cent of oil is added in a year. In a similar plant, where greater care is taken to prevent contamination of the oil, only 51 per cent is added, and in a third plant where filters are used the make-up is only 41 per cent of the total.

The quantity of oil filtered varies considerably and it appears that the less filtering capacity is installed, the more make-up oil is required.

The quantity of oil cooling varies greatly. In many cases it appears that inadequate cooling surface is provided or else the cooling coils are designed so that they cannot be properly cleaned, with the result that the heat transfer is greatly reduced.

Table No. 4 gives a comparison of oil and cooling water temperatures of the different stations.

Table No. 4
Comparison of Oil and Cooling Water Temperatures

| Plant..... | I | II | III | IV | V | VI |
|-----------------------------|-------|-------|--------|--------|--------|-------|
| Oil to cooling tanks..... | 157° | 120° | 150° | 142° | 135° | 132° |
| Oil from cooling tanks... | 97 | 98 | 140 | 139 | 110 | 110 |
| Oil to bearings..... | 97 | 98 | 140 | 139 | 110 | 110 |
| | | Vert. | Horiz. | Vert. | Horiz. | |
| Oil from step bearing.... | ... | 150 | ... | 138 | ... | 140 |
| Oil from tur. bearing.... | ... | 150 | 166 | 130 | 120 | 135 |
| Oil from mid. bearing.... | ... | 180 | 184 | 145 | 141 | 140 |
| Oil from gen. bearing.... | ... | 170 | 170 | ... | 130 | ... |
| Water to cooling coils.... | 61 | 75 | 72 | 64 | 60 | 58 |
| Water from cooling coils... | 82 | 76 | 78 | 68 | ... | 62 |
| Water to bearings..... | ... | ... | 58 | ... | 60 | None |
| Water from bearings.... | ... | 64 | ... | ... | 71 | ... |
| Water to cooling tower.... | ... | 80 | ... | ... | 70 | None |
| Water from cooling tower... | ... | ... | 76 | ... | 60 | ... |
| Kind of water..... | Fresh | Fresh | Fresh | Fresh | Fresh | Salt |
| Coils in tanks..... | Iron | ..... | Copper | Copper | Iron | Brass |

It is desirable to keep a record of temperatures of both oil and water in and out of the coolers, and calculations of the heat transfer should be made at frequent intervals in order to determine the effectiveness of the cooler and to indicate when scale is forming in the coils.

There is a tendency to depart from the former practice of placing cooling coils in the turbine bases of horizontal machines and to install separate tubular coolers instead. Coils placed in the turbine base or in storage tanks are difficult to clean, both internally and externally, and can only be cleaned by shutting down and draining the tanks. If coils are installed in tanks they should be off the bottom of the tank where the sludge collects, as the sludge collecting around the coils interferes with proper heat transfer. The pipe outlets from the coils should run out through slots in the top edge of the tanks, so they can be readily removed and so they will not interfere with the closing of the tank covers. Where brass or copper coils are connected to iron pipes, the connection should be made at a point outside the tanks so that leakage resulting from galvanic action will not cause water to leak into the oil.

The coils should be made preferably of iron, and fresh water should be used as the cooling agent. Where it is necessary to use salt water for cooling, the coils should be of brass. The use of iron coils reduces the electro-chemical action and also the catalytic effect of sludge formation in the oil.

Water cooled bearings are provided with flat copper coils embedded in the babbit. These coils cannot be cleaned mechanically, and owing to the high temperature existing in the bearings there is a tendency for scale formation. These coils should be washed out chemically occasionally to remove the scale. Strainers should be provided to prevent foreign matter entering the coils.

All oil coolers should be accessible for repairs and cleaning. Separate units should be installed and arranged so that one unit can be cleaned without shutting down the turbine. It is important to provide vents on vertical oil coolers, provided with relief valves, to prevent the accumulation of gas

or air which may result in the cooler becoming air bound and failing to perform its function. The high pressure used on step bearings on vertical turbines may result in damage to the oil where leakage occurs through the suction valves of the pumps. This permits expansion of the oil through fine streams, atomizing it and tending to crack the oil. If allowed to continue, serious damage may be done to the oil from this cause. When the oil is cracked the impurities present are given a full chance to attack and destroy the oil, particularly so where a large amount of air is present.

Horizontal turbines are ordinarily provided with an oil pump, operated by the main shaft of the turbine, and an auxiliary steam driven pump for use in starting and stopping and for emergency in case the main oil pump should stop pumping for any reason. It is important to provide automatic starting arrangement for the auxiliary oil pump so that it will start up immediately in case the oil pressure becomes low. As a further safeguard, it may be desirable to install a gravity oil tank of sufficient capacity to furnish oil until the machine comes to rest. In case of stoppage of oil flow to the bearings, the machine could be stopped automatically and the gravity tank cut in to prevent damage before the machine comes to rest.

In order to prevent contamination of the oil by air it is desirable to discharge oil into tanks below the oil level, for when the oil discharges at the top of the tank above the oil level a considerable quantity of air is carried down into it. The overflow outlet test holes from the turbine bearings should be kept closed to prevent air being sucked in by the flowing oil. A hinged glass cover may be provided for observation and temperature readings.

Strainers should be considered an essential part of the filtering system and they should be placed:

1. On suction to pumps.
2. On discharge from pumps.
3. On returns to sump tanks.

They should all be of the twin type, to be cleaned during operation. Strainers will catch remnants of packing from step bearing pumps and remnants of gaskets and packing from pipe joints, etc., which are bound to wear off and find their way into the system.

The sump tanks should also be considered as part of the filtering system and the baffles arranged to cause sludge to deposit to as great an extent as possible before oil is drawn to filter.

The baffles should be so placed as to effect a precipitation of suspended matter, and sufficient drains should be provided to draw off sludge and water. It would be possible in designing such tanks to avoid gage glasses as they are very unreliable. Instead a glass insert set in metal of tanks, glass doors in side near bottom could be used for observation. The latter have the additional advantage of being capable of being used for cleaning without removing tops.

Care should be taken that the dirtiest oil and sludge are not drawn to filter. The cleaner the oil the better filtering is accomplished. It is doubtful if the filter is any value when oil is in exceedingly bad condition. The filter cloth in some cases where oil is badly oxidized rots extremely fast, and particularly so on top part, indicating that the functioning of the filter is short circuited. In such cases the oil passes through only the upper portion of the cloth; the dense oil in the lower half appears to be in a state of rest.

Oil to reduction gears on auxiliaries should not be allowed to connect with main turbine oil system as there is danger of water entering through glands on auxiliaries, and also gearing might operate better with oil of a different viscosity.

Absolute prevention of contaminating influence is practically impossible. Therefore limiting the items tending to

wards injury appears to be the solution, and the most prominent agency to accomplish this result is a means to continually remove water, sludge, etc., even if only of a very slight daily amount. Arrangements to conveniently allow this to be done should be given serious consideration, and special attention should be given to the following points:

1. Proper design of appliances.
2. Proper arrangement at accessible places.
3. Easily accessible for repairs, inspection and cleaning.
4. Strainers and filters of sufficient capacity kept in

such condition that they will function to full capacity at all times, greatly facilitated by keeping the oil in such condition that water separates readily and contamination is reduced to a minimum.

Where a chronic condition exists such as water entering and injuring the oil, an unrelenting exertion should be applied to prevent any damage or devitalizing effect to grow on the oil, and an immediate and vigorous research instituted and continued until the trouble is located and remedied.

Operating Code

This is a subject which has been given considerable attention during the last two or three years by the Technical Section, and when the writer was at the Technical Meeting in Milwaukee in September, the chairman of the National Technical Section advised that he realized that consideration of this subject would have to be extended over a long period, but the various geographical sections were asked to give the subject some consideration.

It is generally recognized that in the employment of a definite operating code in the plants of any power system, benefits are certain to accrue. Not only is an operating code an aid to efficiency in operations from the standpoint of economy, but efficiency in plant personnel as well. It makes for reliability of operation by diminishing the injurious effect of frequent changes in personnel. Not necessarily changes in executive personnel, but rather those subordinates requiring executive supervision. Often it is the case that the ideas of some able executive engineer are followed out in practice until a change of superintendents, after which he finds later that operations are deviating from his rules to the detriment of the system.

A definite operating code would go a long way toward improving operating conditions in such cases. It might be found very difficult to formulate such a code on a national basis owing to the different operating conditions prevailing in different localities. Changing conditions in the art and the personal opinions of minor executives would prove difficult obstacles to overcome. Nevertheless, such a code offers many opportunities for putting the best methods of the industry into practice.

First of all, in consideration of such a code it is manifestly necessary that operating men be agreed upon definitions in order to have some ground for comparison of plant or system performance. Accordingly, the work of the sub-committee this year was to confine its efforts to a study of the operating code definitions as submitted by the Technical National Section and to comment on them, offering suggestions and criticisms.

The definitions as outlined fall under six general heads, as follows:

- A. Property and Equipment Definitions.
- B. Input and Output Definitions.
- C. Capacity Definitions.
- D. Factor Definitions.
- E. Performance Definitions.
- F. Auxiliary Energy Definitions.

The definitions as given are confined entirely to steam stations and systems, taking no account of combinations of steam and hydraulic units or plants. Many of the definitions refer to coal only, whereas complete treatment requires that they take account of all fuels, although avowedly the inten-

tion to treat of definitions applying to the more complicated operating cases only after the simpler definitions had been agreed upon and to include all other varieties of fuel in the final revision; the effect has, nevertheless, been to rather limit the discussion as among the sub-committee members of the Pacific Coast Electrical Association.

Of the ten members of this particular sub-committee representing eight different power companies comments were received from five representatives of that many companies, indicative of some interest in the definitions after all.

I will not attempt in this report to include all the criticisms of the definitions as outlined by the National Technical Section. The criticisms of our members have been sent on to the National Technical Committee for consideration. This whole subject is one which must be considered by the Central Committee and our assistance in the matter is confined to giving them our criticisms of their definitions. I might add that of the members of the committee who replied, they did not touch, or rather passed over, the great majority of the definitions as accepted by the National Technical Committee. It would appear from this action that the majority of the definitions met with the approval of the members of this committee.

Boilers and Accessories

Generation of electricity by oil fuel has been largely a Western development, and has been employed on so extensive a scale that operating methods and results may be fairly well standardized for any given set of conditions.

Crude oil being practically the only fuel available in sufficient quantities in this territory at a price justifying its use in industries of this character, this method of generation has been followed almost exclusively, except in certain plants located near the oil fields where large supplies of natural gas as a by-product of the petroleum industry have become available as fuel. In the Pacific Northwest sufficient refuse from the saw mills is available to insure a dependable source of fuel, but even here oil burning equipment is usually installed to supplement the other fuel.

In most cases the object in view in developing steam generating plants in this territory has been the provision of emergency, or stand-by equipment, to supplement the existing water power installations, in order to protect the systems, as far as may be, against sudden physical interruptions and provide a reserve source of power against abnormal periods of low water supply. Another justification of steam generation, peculiarly a problem of the rapidly growing West, is to care for the natural growth of population and consequent demand for electrical energy during the period of construction of water power plants, thus insuring a connected load ready to shift to the hydro plant on its completion sufficient for its economical operation.

Steam plants of this character usually operate at very low load and plant factors. The average capacity factor, or ratio of output to installed capacity, of the plants reporting in this district being as low as 14.87 per cent for the year 1922. The amount of time on stand-by, or operating at light and fluctuating loads, are usually excessive, and periods of maximum demand may be sudden and severe. Such features seriously affect operating efficiencies in the boiler rooms and may easily result in increased maintenance costs as well. It naturally follows that electricity developed from such stations costs materially more per kw-hr. than where generated by water power or by steam plants operating under more favorable conditions, and the reduction of such costs to reasonable figures while maintaining the protection demanded by good service is a very difficult problem indeed for many systems.

As far as the boiler room is concerned, such condition of load and stand-by being determined by outside sources,

the conditions under which it must operate are more or less fixed, and the problem remains to determine the best equipment for such service, or the best method of operating existing equipment, and it was with the idea of discovering the practice of member companies along such lines, particularly regarding maintenance, that your committee directed its investigations this year.

The tendency in these newer installations appears to be towards somewhat larger units, the largest being 1,166 horsepower rating. Stirling type boilers are all equipped to take steam from the back drum, and one company has installed integral economizers. Combustion space has been increased to around 2.6 cu. ft. per rated horsepower and higher settings are used. It is expected the mechanical atomizing equipment will enable higher ratings to be carried with increased efficiency. Tests on the original installation of these burners showed as high as 80 per cent boiler efficiency at 300 per cent rating. The mechanical burner also is said to produce a softer flame with less damage to furnace walls.

A new design of mechanical atomizing burner has recently been placed on the market wherein variations of range is secured by passing oil from a central chamber in the burner, eliminating the necessity of changing tips to secure a change in capacity. The manufacturers claim these burners will operate on from 250 to 1,820 lb. of oil per hour per burner, or a range in steaming capacity of approximately 90 per cent without changing tips. The burners are designed to operate at a pressure around 200 lb., but it is claimed they will give a good spray at pressures as low as 35 lb. per sq. in. Oil temperatures range around 210 degrees for 16 Baume oil, varying somewhat with the gravity and constituents of the oil.

Criticism of old installations include the following:

Units too small, too little combustion space, boilers set below the ground level. Boiler columns and supports located at points where they are easily damaged by fire. Tendency of boilers to prime severely at over loads if concentration is carried at all high, insufficient space in feed water heaters. Feed water heaters set too near the level of feed pumps and electrically operated feed pumps subjected to line disturbances.

A large number of small boilers will require approximately the same number of attendants as the same number of units of larger size, while maintenance and radiation losses will be considerably higher than the same capacity in larger units.

A universal complaint in the older installations has been the limited combustion space allowed, usually between 1.5 and 2 cu. ft. per rated hp., which seriously limited efficiencies at higher ratings. Various methods have been used to increase this space, including straightening fronts on old style Stirling boilers, moving the bridge wall in B & W, lowering the floors and the installation of certain types of patented furnaces.

In the old style Stirling boilers with sloping fronts the supporting column for the top drums was located in side walls at about the point of the most severe action of the fire, and unless the brick work was well maintained was often damaged. When these fronts have been straightened it has been customary to move these columns outward to secure the protection of the front wall, which seems to eliminate all trouble from this source. Superheater hangers, where suspended from the top member, are also liable to damage by the fire and have been replaced by cast saddles resting on the side members, which seem to give better protection.

Stirling type boilers taking steam from the middle drum show considerable tendency to prime when forced much above rating unless the concentration is kept low or the average practice being from 80 to 150 gr. per gal., with a maximum of around 200 gr. per gal., depending somewhat on the nature of the fuel and the per cent of rating carried. Gas fired boilers show a greater sensitiveness in this regard, due to the greater cleanliness of the tubes with the consequent greater heat absorption in the first pass. One company has successfully changed the outlet on its boilers from the middle to the back drum and report good results.

Many of the feed water heaters installed were equipped with extremely small storage capacity, giving little reserve for the pumps in case of fluctuations in supply, and some of the newer installations are making more generous provision in this regard. Some heaters were also installed with very low suction head to the pumps, making operation troublesome when temperatures were raised to around 212 degrees.

When electric driven boiler feed pumps obtain current from the main distributing system they are subject to its disturbances, and while serious trouble from this regard is extremely rare, it may at times of severe overload with frequency considerably below normal, result in considerable difficulty in getting sufficient water to the boilers. Where equipment of this kind is used, reliability makes it desirable to have either auxiliary steam equipment or a separate source of electric power.

At no plant in this district is any effort made to approach the high ratings carried by the Eastern plants, the average in practice being around 150 per cent, with a maximum of about 200 per cent, which appears to be about the

maximum attainable with the older equipment using steam atomizing burners, the limit being set, apparently, by the ability to obtain a sufficient admixture of air and the temperatures the furnace linings are able to withstand.

Mechanical atomizing equipment being installed in plants under process of construction will probably allow higher ratings to be carried when desired, but no data is as yet available.

The following table, giving size and type of boilers and ordinary and maximum ratings carried, show operating practice of plants in this district:

| Plant | Size of boilers | Type | Ordinary rating carried | Max. rating carried |
|-------|--|----------|-------------------------|---------------------|
| A | Oil & Gas (777 & 850)..... | Stirling | 160% | 190% |
| B | Gas (822 Stirling) (825 Connelly)..... | | 135% | 190% |
| C | Oil & Gas (640 h.p. Stirling) (640 h.p. B. & W.)..... | | 150% | 200% |
| D | Oil (520 & 1200 h.p. B. & W.)..... | | 150% | 244% |
| E | Oil & Gas (535 & 890 Stirling)..... | | 140% | 150% |
| F | Oil (500 h.p. Stirling)..... | | 10% (standby) | 200% |
| G | Oil (823 h.p. Stirling)..... | | 110% | 250% |

Perhaps the greatest upkeep cost of many boiler rooms occurs in furnace repair, which when neglected may affect operating efficiency and even result in serious damage to steel supports and boiler structures. An analysis of costs of this work in one plant of 19,000 boiler hp., operating 24 furnaces, gave an average over a three-year period of \$.086 per 1,000 kw-hr., or \$426 per furnace per year, where furnaces were maintained in good condition and boilers were operated around 150 per cent of rating. These furnaces had all been operated over ten years without rebuilding, so the above figure probably represents about the average yearly maintenance for this work at this plant. Sufficient data were not available to get comparative cost of this work, but it would probably be found to depend largely on the percentage of rating carried and hours run.

Unfortunately, the grades of fire clay available on the Pacific Coast do not produce a very dependable furnace lining, and the price of eastern fire brick in this locality makes their use prohibitive. All plants reporting used brick of local manufacture, and all, with one exception, expressed a desire for brick of higher refractory qualities.

An effort has been made by at least one manufacturer to meet this demand by treating local clay in the electric furnace, regrinding and burning into a brick from which practically all fusible material has been eliminated. Brick of this type will easily withstand the temperature encountered in the boiler furnaces, but sometimes show considerable tendency to spawl after prolonged use.

Several companies reported the use of one or more of the brands of plastic fire brick to a limited extent, and comment on this material was universally favored. It is easily applied, results in a very tight wall, free from joints, and has little tendency to slag or run. Its higher price, however, restricts its use to points of severest deterioration. One company molds the checker work and furnace floors from this material as well as using it in the side walls. Others have found it useful in repairs and small patches that would not justify relaying a considerable portion of wall.

Condition of service and feed water vary considerably—also the amount of upkeep of drums and tubes for different localities—but for companies reporting in this district the length of time between cleaning varied from four to six weeks, or approximately 1,000 hours actual service where water is not treated, to from six to twelve months where water softeners are used. Internal methods of cleaning include the usual turbing of tubes and scraping or brushing of drums, followed in many cases by the application of some form of in-

side paint, "Spartain" being the brand most commonly used, others being graphite and kerosene (below the water line) and zinc oxide and kerosene above the water line, and graphite and marine engine oil (principally rape seed oil). The frequency of application varied from three months to a year. Only two cases of internal pitting were reported, evidently caused by oxidization due to air dissolved in the water. These were corrected by the use of the internal paint, which also prevents to some extent the adherence of scale to the shells.

Several cases of external corrosion of drums and tubes were reported due principally to admixture of moisture with collections of soot. A chemical analysis of soot from the rear pass of an oil fired boiler gave the following results:

| | |
|---|--------|
| Carbon, etc..... | 51.15% |
| Silica (SiO ₂)..... | 1.89% |
| Iron (Fe ₂ O ₃)..... | 12.50% |
| Calcium (CaO)..... | 0.60% |
| Magnesium (MgO)..... | 0.20% |
| Alkalies (as NaO)..... | 6.24% |
| Chlorine | trace |
| Sulphate (as SO ₃)..... | 27.42% |
| Total..... | 100% |

The acidity of the material calculated as sulphuric acid is 21.13 per cent. It is seen that approximately only half the material is really soot in the sense of unburned carbon. Sulphur in the oil is responsible for the formation of sulphates, which upon the addition of water, results in the attendant action upon shells and tubes. The remedy consists of stopping the leaks where possible and cleaning and painting the shells with red lead and oil, graphite and oil, or Spartain external paint, usually applied with an air spray.

The tube renewals in most of the plants reporting were extremely small, ranging from nothing to from five to seven tubes per boiler per year, the higher number being in plants that had been in service from twelve to fifteen years. The principal losses occurred either in the front banks, where tubes were subject to the more intense heat, or at the lower ends of the rear pass tubes, where leakage from super heaters caused excessive corrosion. This latter has caused extensive tube renewals in some boilers, where superheaters have been neglected.

All plants in this district where operation is at all continuous have installed soot blowers of either the Diamond or Vulcan manufacture, and uniformly report good results, except in gas fired plants, which have no soot to blow and do not use the blowers except when changing to oil.

The earlier installations consisted of eight or nine blower units, distributed through the boiler passes, but recent practice has shown a tendency to limit their use to the second and third pass, installing either three or four units. This arrangement has been found to remove the heavier soot deposits and eliminate the frequent replacement of warped and burned units where they were installed in the hotter parts of the furnace, and while materially reducing the original and maintenance cost of the installation, reduce the flue gas temperature to within 35 to 50 degrees of the complete installation.

Some cases of warped and sticking units were reported with the old style heads, which have been eliminated in the new valve in head type, which also reduces the amount of steam used in blowing to a minimum.

Frequency of operation varies from every eight to twenty-four hours where boilers are operating fairly continuously to once a week on stand-by service. The attached curve shows increase in flue temperatures per hour after blowing on a Stirling boiler equipped with nine units of Diamond blowers, the boiler operating at a fairly constant load of approximately 150 per cent rating.

It will be noticed that the first 10 or 15 degrees temperature rise occurs fairly rapidly during the four or five hours following blowing, followed by a more gradual rise of approximately 15 or 20 degrees more during the remainder of the 24 hours. The second curve on the same sheet shows

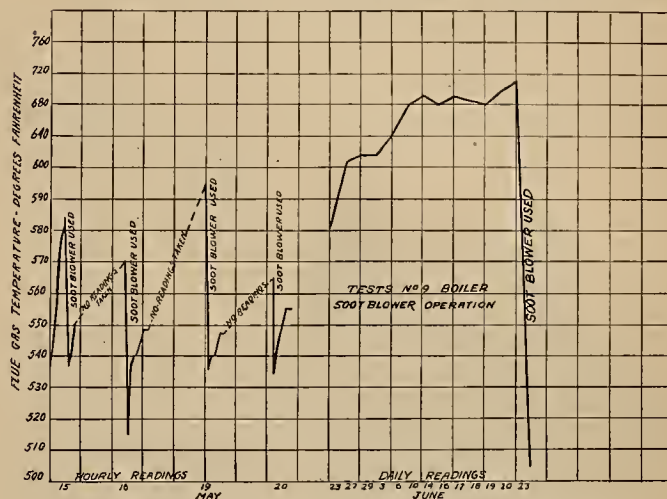


Diagram showing the results of blower tests on one boiler.

the effect of discontinuing their use over a period of three weeks, during which time the temperature rose fairly uniformly during the first 17 days to approximately 150 degrees above the average when the blowers were used, after which it held fairly constant during the remainder of the time, returning again to the original figure upon the resumption of blowing.

Some trouble was reported, due to leaky caps in superheater drums, the seats having become scored or pitted. Remedies have included rolling in plugs, the most satisfactory being made of short lengths of tube welded shut at the top, welding plugs into the drums, and the use of some of the brands of Hot Joint paste on the gaskets. Excellent results are reported from the latter practice, using manganosite. Another indirect remedy consists of installing thermostatic traps on the superheater drains to eliminate the accumulation of water in the drums. Such leaks are a source of considerable deterioration to drums and tubes during periods of stand-by, and may result in serious damage if allowed to continue over long periods of time. No excessive losses of pressure through superheaters were reported, the average being from 2 to 7 lb., the latter at approximately 185 per cent rating. It is understood that one company had some difficulty in this regard and substituted nozzles for the usual cores on the saturated side, with good results.

Plant arrangement determines quite largely the number of attendants necessary in the boiler room, and it is often the case where additions have been made that the new boilers are placed in such manner, or so remote from the older installation, as to render it impossible for one man or one crew to attend both units, even where the amount of attention would not be large. The location and types of pumps and auxiliaries also sometimes require extra attention, as well as the nature of the load the plant is expected to carry.

Where conveniently arranged, the usual practice seems to be about one man to every eight boilers, or a fireman and water tender to 18 boilers, per shift. This would also call for the presence of some one in addition qualified to investigate and care for unusual cases of trouble, and would include the necessary attention to the boiler room auxiliaries.

Division of duties also varies in different plants, in some it being the practice for one man to both fire and tend water on a certain number of boilers, while in others the

firing of a larger number of boilers constitutes one man's duties, while the water is looked after by another.

The following table shows the practice of companies in this regard:

| Boiler hp. | No. of boilers | No. firemen per shift | No. water tenders per shift | Other attendants |
|-------------|----------------|---|--------------------------------------|---|
| 19,000..... | 24 | 2 | 3 | 1 senior fireman |
| 3,500..... | 7 | 1 | 1 | General foreman charge of operation & repairs |
| 13,250..... | 28 | 3 | (Two boiler rooms in the same plant) | Two extra men on 11 to 7 a. m. shift blow down and get concentration test |
| 5,340..... | 6 | 2 | | Water tender cares for pumps and heaters |
| 7,380..... | 12 | 1 fireman to 6 boilers 1 fireman on 8 oil burners 4 on 4 lamp black boilers | | |

While performance of boiler equipment under test conditions is easily reduced to standard conditions, it is a more difficult problem to develop any standard of operating efficiency by which to measure the actual results secured in practice that will include the varying conditions of load, type of apparatus, stand-by, fluctuations, etc., which have a considerable influence on the kilowatts per barrel produced.

Practice of companies reporting varied from practically no comparison except the logged output, through short daily and monthly summaries of kw-hr. produced, fuel used and other principal operating features, to the more elaborate efficiency sheets where as many factors as possible affecting plant operation are calculated each day and plotted in a series of curves tracing the variations of all metered quantities.

Another and generally used method is that of referring daily results to a standard curve of plant efficiency, where kilowatts generated are plotted against oil burned, data for the curve usually being obtained from past plant performance. Daily or shift results are referred to this on the basis of 100 per cent operating efficiency for points falling on the curve and corresponding lower or higher values as points are above or below the calculated values.

These methods are open to the objection that the time element or turbo hours and reserve boiler capacity are not allowed for. And it is obvious that the same operating efficiency could not be expected of a plant with three turbines in operation carrying a load considerably below the rated capacity of one machine that could be expected with only the one machine running.

A modification of this method, including a correction for turbine hours, is in use by one company which reports

a gain of 10 per cent in operating efficiency in two years through interest stimulated in this manner.

Sample sheets are attached of a development of this idea, including allowance for number of boilers in service and turbine hours run by units of different size and efficiencies. This gives a remarkably good analysis of daily operating conditions, is easily prepared and affords perhaps as accurate a yard stick as any by which to measure plant economy under extreme variations.

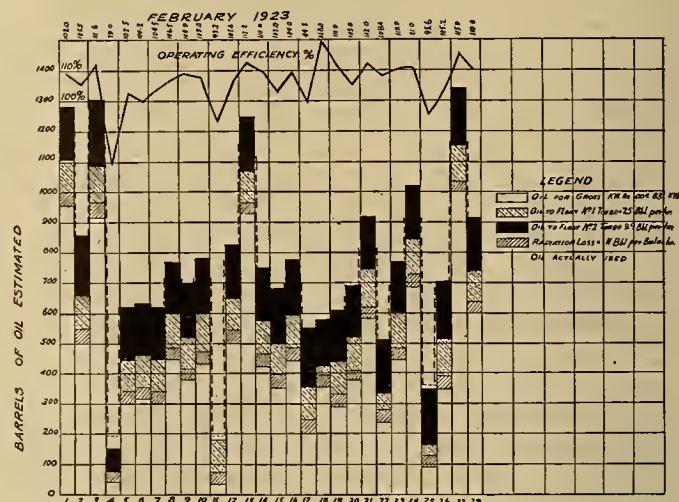


Chart showing actual operating efficiency, described in the text as Sheet 2.

Once the standard curves shown in sheet 1 are plotted for the given conditions no further computations are necessary, as daily results for any load or hours run of any unit can be transferred to the curve sheet by use of a pair of dividers, as shown in sheet 2, it being only necessary to calculate the percentage of actual to estimated barrels to plot the efficiency curve. When the different quantities are blocked off for each day as shown it also makes it easy to determine their relative importance and obtain a clearer idea of the ratio of useful to wasted fuel.

Station Instruments

Nearly all plants on the Coast are using flow meters for various purposes. In a number of cases meters indicating only the flow of steam are use as a guide in properly proportioning the load between boilers for indicating steam consumption on turbines and for indicating steam used for atomizing oil fuel. These are of little value except as they are made valuable by intelligent use by the operating force, as no record is left for future reference or comparison, and there is no means of determining the total consumption or output of various apparatus.

As these instruments are made recording, so that a record is left of the performance of machines, apparatus and men, their value becomes greatly enhanced.

Integrators on these instruments are in limited use, although in many instances they were originally furnished with the meters, but were removed because of unreliability under the conditions of operation.

As a great number of records are simultaneously made on one chart, the value of the records so made become greater, provided, of course, that these pertain to conditions of definite relationship.

Boiler meters recording simultaneous records of steam flow, air flow and flue gas temperature are in very common use and are of a considerable value, both for economy of operation and for checking condition of apparatus, output of boilers, plant consumption, etc.

Steam flow meters recording only the flow are of no great value for accurate determination of superheated steam

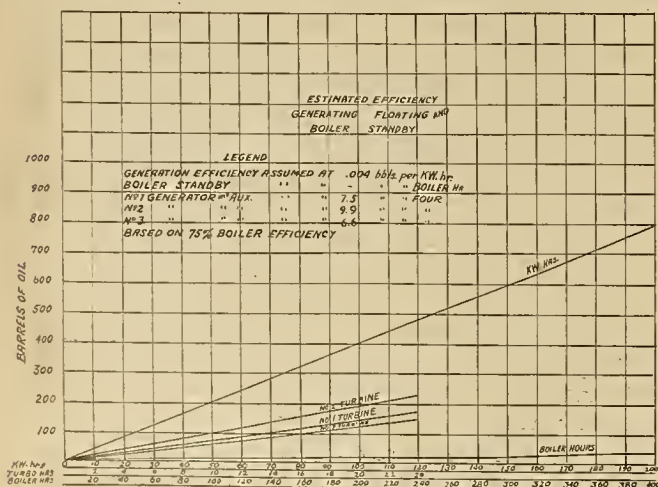


Chart showing estimated efficiency, described in the text as Sheet 1.

unless supplemented by recording pressure gage and recording thermometer, both placed in the immediate vicinity in the steam line with the flow meter connections.

The use of pitot tubes in connection with flow meters has become obsolete, giving way to the flow nozzle in some cases and to the thin plate orifice in others. The thin plate orifice seems to have the preference over the flow nozzle, due to the greater ease of installation and care.

Flow meters working on this plate orifice follow very closely the laws governing the venturi tube and are, therefore, much more easily calibrated.

Venturi meters are in use in a number of plants for measuring condensate and for measuring feed water. In at least one case the venturi meter is used for measuring oil to the boiler furnaces. One plant uses one venturi meter for interconnecting to condensate lines on a number of units.

The value of recording thermometers on steam and exhaust lines is not generally appreciated. They are of more value in the determination of energy distribution than any other class of instrument except, of course, the pressure gages. There is nothing that will give as accurate information regarding absolute back pressure in exhaust lines as the temperature of the dry saturated steam therein. As a check on condensing and vacuum apparatus it has no equal.

There seems to be a general impression that CO₂ recorders are, as a rule, unreliable and inaccurate, not sufficiently rugged to withstand the wear and tear of general use. The Mono Duplex CO₂ recorder seems to be quite reliable and accurate, requiring the minimum of care.

This instrument gives all the useful information that could be given by an Orsat if in constant use by a skilled operator. Omitting the human element, as it does, it becomes invaluable in boiler-room economy.

Referring back to Bailey boiler meters and the method of adjusting air flow to steam flow, so long as the Orsat is taken as a basis for this adjustment the question naturally arises: Why not keep an automatic Orsat at work on the boiler furnaces?

The general use of chemical rather than electrical instruments seems to be the practice for condenser leakage, except in plants using sea water for cooling purposes, where in most cases it has been found that the quicker and more convenient electrical instrument is the rule. The use of recording instruments for this purpose has apparently not become the practice yet, though there seems to be considerable to recommend it.

Careful use of the chemical process of detecting soluble salts in water will enable determination of percentages of make up condenser leakage, boiler concentration and numerous other quantities it is desirable to know.

The following is suggested as a very complete installation for a plant of moderate size, smaller plants avoiding those whose value would not seem to justify the expense of installation:

Boiler Room Instruments

(Not including indicating gages in common use.)

- For each boiler—
 - (1) Ellison draft gage.
 - (2) Bailey boiler meter.
 - (3) Venturi tube in feed line with connections so arranged that it can be cut in on a central meter serving not more than four boilers.
 - (4) Fuel measuring device for complete check on fuel to each boiler.
 - (5) Recording thermometer in boiler outlet.
- For each four boilers—
 - (1) Venturi meter for use on individual feed lines as mentioned above (3).
 - (2) Mono Duplex CO₂ recorder.
- For each unit of boilers—
 - (1) Recording steam pressure gage.
 - (2) Low range indicating gage, for master gage.

Engine Room Instruments

- For each main unit—
 - (1) Flow meter showing steam flow, pressure and temperature records.
 - (2) Recording thermometer showing temperature of exhaust.
 - (3) Recording vacuum gage.
 - (4) Mercury vacuum gage as check on (3).
 - (5) Bi-record recording thermometer on circulating water inlet and outlet.

- (6) Venturi tube and meter circulating water discharge line.
 - (7) Indicating thermometer in hot-well line.
- For each unit of auxiliary apparatus—
- (1) Steam flow meter with pressure and temperature records.
 - (2) Recording thermometer in auxiliary exhaust line.

For water measurement—

- (1) Cochrane V-notch meter showing simultaneous temperature record in connection with feed water heater.
- (2) Neptune or similar meter on make-up. (This meter should be of sufficient capacity to measure entire consumption of plant, as this may be the only source of supply to boilers in case of sudden drop in load.)

The above instruments would give all necessary data for working out a complete heat balance for entire plant. They would also give sufficient check on condenser performance, leakage, etc.

Condensers

The chief source of trouble in steam condensers on the Pacific Coast seem to be tube pitting and corrosion and ferule leakage.

It is quite generally considered that coarse crystalline structure of the metal is an evidence of conditions which promote corrosion and certain tube manufacturers are prepared to furnish tubes with a grain structure having crystals not exceeding .02 to .03 millimeter in diameter.

We have not obtained any data upon actual experience with such special tubes, but have found extremely rapid corrosion in cases where the structure was very coarse.

All kinds of packing has been used in the past in the effort to obtain a tight gland without excessive seizing of the tube. Of recent years metallic packing has given good satisfaction after the peculiarities of installing it were understood. In some cases light fibre rings have been put in ahead of the packing to eliminate the tendency of the packing to squeeze through between the tube and tube sheet. The practice of omitting ferrules when using metallic packing is still in the experimental stage. An advantage claimed for this packing is the electrical bonding of tube and sheet, which should tend to reduce corrosion. There is a type of corrosion which attacks the entrance end of the tubes and is probably an erosion due to the turbulent state of the water. Partial remedies have been found in painting, tinning or otherwise applying a protective coating to the first six inches or so of the tube. Paint offers the advantage that it can be applied and renewed without removing the tubes from the condenser.

Attention may be called to an experience with large condensers where tube sheets were found, after some years of service, to be cracked around the edges, apparently caused by expansion and contraction of the tubes bending the tube sheet back and forth. It is not possible to definitely connect this trouble with any particular kind of packing, as different kinds were in use at different times.

Such information as has been furnished upon natural draft cooling towers indicates that circulating water may be cooled to about the dry bulb temperature, and that the make-up water required is approximately equal to the rate of evaporation from the boilers. The loss from the tower by wind carrying away spray may be in excess of this, but where such spray loss is prevented by louvers the above rule holds. It is advantageous to have the louver slats amply broad. Metal strips placed at right angles to louver boards at their outer edges still further conserve water from being blown away.

The growth of algae in the cooling tower may be controlled by copper sulphate in a dilution of 1 to 4,000,000.

The general practice as to specifications for circulating pumps was found to be that the purchaser specified the flow required and also the delivery and suction heads against which it was to be delivered, thus assuming the uncertainties as to friction heads.

The chairman of the Prime Movers' Committee of last year recommended that special study be given to an Operating Code, and I wish to concur with him in this recommendation for the work of the next year's committee.

ELECTRICAL CONSTRUCTION



THE use of electrical appliances and devices consuming 450 watts or more, and the use of plug clusters screwed into a socket of a fixture wired with No. 16 or smaller wire (each cluster supplying two or more devices), thereby imposing a load of 8 amp. or more on a socket designed for 2.25 amp. and on a wire which is approved by the National Board of Fire Underwriters for 6 amp. in the case of No. 16 and but 3 amp. if the fixture is wired with No. 18 wire, is a common occurrence where adequate outlets are not available. In order to eliminate the use of these devices in this hazardous manner, it has been deemed necessary by the municipal inspection departments of many cities to provide in the following manner for this condition: in the dining room, kitchen, breakfast room, breakfast nook, laundry (or porch used as a laundry), or bathroom, a convenience outlet, if installed, can be connected to a 660-watt, 2-wire lighting circuit, but no additional convenience outlets can be installed on such lighting circuit.

If no convenience outlet is installed in any of the above mentioned locations, it is required that the lighting fixtures in such rooms be wired with No. 14 B. & S. gage (or larger) wire and that all sockets have an approved rating of not less than 660 watts. In all other rooms, if convenience outlets are installed, not more than four shall be installed on any one 660-watt, 2-wire lighting circuit. In computing the load on the circuit, each single outlet shall be rated at not less than 100 watts and each duplex outlet at not less than 200 watts.

Special Convenience Outlet Circuits

As all modern homes have two or more convenience outlets in each room, it became apparent to the inspection departments that special convenience outlet circuits were desirable and could be installed as a separate system from the general ceiling and bracket lighting circuits at no additional expense. The following rule has been devised to meet this condition:

"A total of 8 single or 4 duplex convenience outlets or multiples thereof, regardless of the room in which they are located, may be installed on a 2-wire,

By E. Earl Browne

President California State Association of Electrical Contractors and Dealers

IN the accompanying article, the second of a series, Mr. Browne discusses the latest practice in residence wiring, to provide for the maximum number of convenience outlets on different circuits with the minimum of expense, in conformance with latest code and municipal inspection bureau requirements.

125-volt or less branch of No. 12 B. & S. gage or larger wire, fused not to exceed 20 amp."

In all cases the now standard 6-amp. outlets with concealed contacts, so designed that the cap may be removed without leaving any live parts exposed to accidental contact, are insisted upon. In addition, no screw base receptacle can be installed within 5 ft. of the floor and even in that

case if it is within 4 ft. of an ironing board it is considered as being intended for attachment of an electric iron and must be equipped with a standard convenience outlet as above described.

In the dining room, breakfast room, library and other locations where a table is to be placed away from the wall, it is desirable to have a floor outlet. In order to minimize the expense of installation it has been ruled that if these outlets are installed in wood floors that are varnished, waxed or carpeted, a watertight floor box is not necessary. The only special requirement is that the cover plates be of solid metal at least $\frac{1}{8}$ in. in thickness.

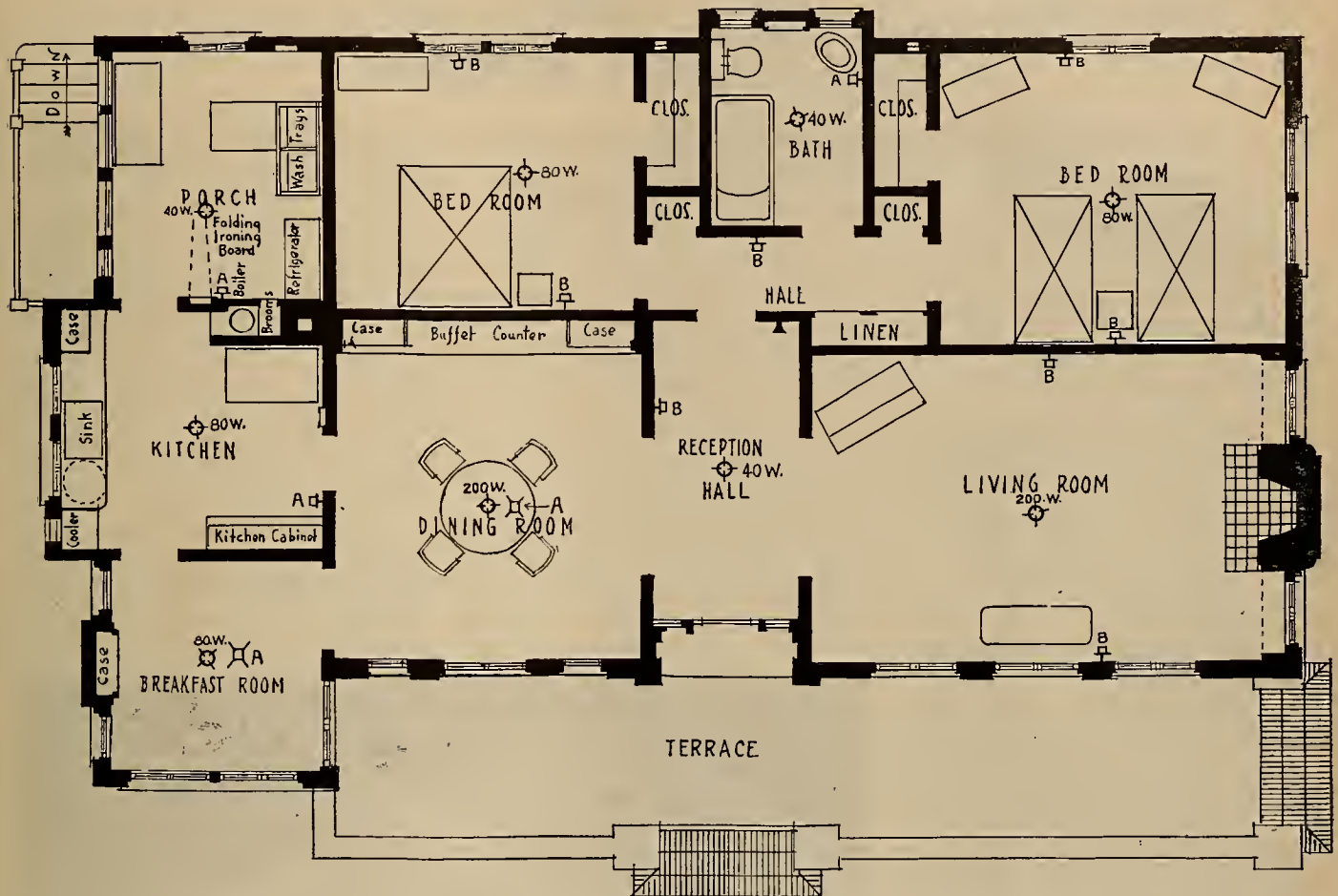
For the purpose of determining the sizes of service, etc., the following rule is to be followed: The first special convenience outlet circuit is figured as requiring not less than 1,600 watts, but each additional circuit is to be figured as requiring not less than 660 watts. The following is an example of this requirement:

| | |
|-----------------------------|-------------|
| 1 convenience circuit | 1,600 watts |
| 1 " " | 660 " |
| 2 lighting circuits | 1,320 " |
| Total..... | 3,580 " |

This would make the service, if 2-wire, No. 8 S.B. Solid R.C. in $\frac{3}{4}$ -in. conduit with a 60-amp., 2-pole switch. If 3-wire, it would be No. 12 wire in $\frac{3}{4}$ -in. conduit with a 30-amp., 3-pole switch. It has also been apparent in many cases that to reduce the cost of electrical installations all outlets were marked as "one electric," which, under the National Electric Code, permitted a total of 16 medium size sockets or lamp receptacles on a 660-watt circuit. After the job had been passed and a certificate of inspection received it was not uncommon to find circuits loaded to 2,000 watts and fused to 20 amp.

A minimum wattage rule has been made to partially overcome this practice. The requirements are that ceiling outlets in the living room, dining room and parlor be estimated as requiring not less than 200 watts; libraries not less than 120 watts; dens, breakfast rooms, kitchens and bedrooms not less

been made to show a complete wiring diagram. For purposes of simplicity only such outlets are shown as are necessary to explain the text. In case convenience outlets marked "A" are connected to a lighting circuit only one is allowed on each circuit. Those marked "B" are limited to four on each light-



The plan above was drawn to illustrate the points brought out in the article. No attempt has been made to depict a complete wiring diagram, only such outlets being shown as are necessary for explaining the text. Convenience outlets marked "A," if connected to a lighting circuit must have but one such outlet on each circuit. Convenience outlets marked "B," if connected to a lighting circuit must have not to exceed four such outlets on each circuit. Each outlet shall be rated at not less than 100 watts if of the single type and 200 watts if of the duplex type.

than 80 watts; and breakfast nooks and all other locations not less than 40 watts. These ratings apply to the first ceiling outlet in a room. Additional ceiling outlets in the same room may be rated at 40 watts each. If any room is equipped with bracket outlets only, these must be wired for a total wattage at least equal to the above minimums. For example, a living room with two brackets would be rated at 100 watts each.

Where two or more lighting circuits are installed, the load must be divided among them as nearly equally as is practicable. Thus, with a total load of 1,500 watts it is not permissible to load two circuits to 660 watts each and the third to but 180 watts. Each should be loaded to approximately 500 watts.

The various points brought out in the foregoing text are shown on the plan below. No attempt has

ing circuit. The minimum wattage for ceiling outlets is also indicated in the various rooms.

New Type of Switch Required for Heater Installations

Since the underwriters are now insisting that 3-heat switches for electric heater installations be of the double-pole type, attention is called to the article appearing in the May 1 issue. The type of switch indicated on the drawing on page 334 of that issue was a 20-amp., double-pole, 3-heat flush switch, which to date has not been on the market in commercial quantities. Switches of the double-pole type are now being manufactured and will soon be available in 30-amp. capacity. A 30-amp. switch will require a universal No. 72171 outlet box and a No. 72-C-21 two-gang switch cover as this switch requires a box at least 3 in. deep.

JOBBER, DEALER AND SALES AGENT



Two California Electrical Homes Are Displayed

Exhibitions at Fresno and Long Beach Attract More Than 30,000 Visitors. San Francisco Home Is Officially Opened.

California's 1923 Electrical Home program has been successfully launched. More than 30,000 people were conducted through the two homes which have been exhibited at Fresno and Long Beach during the past two months, while it is estimated that the number who will visit the San Francisco home, which is now open, will approximate 40,000. According to officials of the California Electrical Cooperative Campaign, under whose auspices the homes are being exhibited, never has such interest been shown on the part of the public as is being accorded the present homes.

The Long Beach Electrical Home, which was exhibited from Feb. 22 to March 7, was visited by fully 15,000 people. The Electric Club of Long Beach was one of the sponsors of the home and it was under this organization's direction that the home was displayed. The house was built by Harold E. Ketchum, architect and builder, furnished through the cooperation of the Long Beach Furniture Dealers' Association and wired by the Electrical Contractors and Dealers' Association, which organization also furnished the appliances.

Through the cooperation of the Long Beach papers, a total of 751 in. of publicity was secured for the home. The various agencies concerned with its exhibition used 1,746 in. of advertising in the local papers. All of the advertising carried a cut of the electrical home inviting the public to call and inspect the dwelling. A supply of over 50,000 attractive stuffers giving the details of the exhibition, and inviting the public to inspect it was distributed with the monthly bills of the central station and the telephone company, through the correspondence of all interested dealers and placed in automobiles parked on the main streets. A total of 3,000 window cards inviting the public to visit the home was displayed in hotels, store windows and business houses. Every automobile in any way connected with those interested in the exhibition of the home bore large windshield stickers which carried the invitation "See the Better Home Electrical, 1705 E. First St. Admission Free."

The local representative of the California Electrical Cooperative Campaign appeared before the Board of Education and extended a cordial invitation to the board as a unit and to the entire staff of Home Economics and Domestic Science Departments together with the pupils and classes, to visit at special

hours this electrical home. It was explained to the board that the electrical industry recognized the fact that the student body of today will be the home-makers of tomorrow, and that with the wonderful strides and advancement the electric idea is obtaining for usage in home illumination, heat, and power, very likely within the next decade the greater percentage of homes in California would utilize electric heat for cooking. That the present is the time to teach, instruct, and instill in the minds of the pupils the necessity of specifying and installing at the time of building, the wiring necessary to meet the requirements of the present and future was also emphasized. Several classes of domestic science, twenty or more pu-

pils together with their teachers, visited the home on special days and were carefully shown the home and all of its electrical equipment.

Special invitations to visit this home were sent to all the women's clubs and organizations in Long Beach and vicinity, and members of the Electric Club appeared before the Rotary Club, Lions Club and kindred associations and invited them to visit the electrical home. Also invitations were extended to the different merchants' associations and the local Chamber of Commerce, all of whom rendered material assistance and gave public endorsement to the showing of this electrical home.

The Long Beach Home is a two-story building containing five rooms, sleeping porch and bath, with the garage an integral part of the structure. The home embodies all of the modern developments for domestic convenience in addition to the electrical features.



Members of the Long Beach Electric Club paying their official visit to the electric home sponsored by them in their city.

Included in the newer electrical conveniences was the dishwasher, which was built into the drain board of the sink and which was connected to the hot water supply and the sewer. A tumbler switch and a control valve for the hot water were installed in the wall above the dishwasher. The kitchen and laundry attracted the greatest amount of attention from the women visitors.

A feature of the exhibition were the lectures which were given on special days and which were advertised in advance. Experts on various phases of domestic science spoke before large gatherings of women. Prudence Penny, domestic science expert of the Los Angeles Examiner, spoke on "Use of Electric Appliances in the Home and the Necessity of Sufficient Convenience Outlets for the Convenient Use of These Appliances by the Housewife." Milton Hennoch, electric range specialist of the Westinghouse Electric & Manufacturing Company, addressed a large gathering on "The Advantages of Cooking with Electric Heat." Miss B. E. Galvin, head of the domestic science department of the Edison Electric Appliance Company, also discussed this subject. Miss Ione Calkins, domestic science demonstrator, spoke on the various kitchen appliances and especially the electric mixer.

The home contained thirty light outlets, eighteen switch outlets and nineteen convenience outlets, together with service for the electric range and water heater, the electric dishwasher and electric refrigerator. A complete radio installation was another electrical feature which attracted considerable attention.

In checking over the guest register which was maintained for visitors, it was found that the home had been visited by people from England, France, Italy, Norway, Sweden, Japan, China, and various parts of South America.

The home was flood lighted at night to distinguish it from other new buildings in the tract. It was built to serve as a dwelling for the architect and contractor and since its showing an order has been placed for a similar home to be built across the street and the builder announces that he is planning to construct ten more homes in the same tract which are to be completely electrified.

Hostesses were supplied from the district office of the Southern California Edison Company to assist Miss Helen Grahame, the representative of the California Electrical Cooperative Campaign, in exhibiting the home.

Since the exhibition, several builders have approached the Long Beach Electric Club with the proposal that a similar home be displayed in the fall.

The Fresno Electrical Home is one of four modern dwellings comprising a Better Homes Exhibition in the Sierra Vista tract. It was built by Billings & Meyering, sub-dividers and home builders. N. H. Fisher was the architect. Other firms cooperating with the electrical industry were MacRorie-McLaren Company, landscape gardeners, Sherman, Clay & Company, the L. M. Barker Company, furniture dealers, L. S. Cobb & Company, Inc., Maxwell dealer and the local electrical dealers who furnished the appliances. It was displayed from April 12 to 29.

The home is a seven-room dwelling of Spanish design with terra cotta finish. Every modern convenience was



The Home Electrical

An expression of your Ideals

THE California Electrical Co-operative Campaign Committee takes pleasure in inviting the people of the Valley to see the model Electrical Home in Sierra Vista. Everyone in the Valley who is interested in greater comfort and convenience in the home will gain worth-while knowledge from this educational electrical exhibit. Every housewife, no matter in what walk of life, may vision in the Electrical Home the freedom which may be hers through electricity. For this is the willing servant of all, rich and poor alike, as economical in the cottage as in the mansion.

We urge you to visit the Electrical Home. It is purely an educational exhibit and demonstration. Admission is free, and nobody will be solicited to buy. In Oakland 70,000 people recently visited a similar electrical home.

The doors of the Valley's first complete Electrical Home are open to welcome you. Will you not come as our guest?

California Electrical Co-operative Campaign



An educational organization representing the four branches of the Electrical Industry in California—Power Companies, Electrical Manufacturers, Electrical Jobbers, and Electrical Contractors and Dealers.

The model Electrical Home will be open to the public April 12 to 29th, inclusive, daily 2 P. M. to 10 P. M. and Sundays 12 noon to 10 P. M. It is located on Iowa Avenue near Barton. To get there follow yellow signs out Tulare Avenue to First Street and out Kerckhoff to 12th, then north to Tulare. Or take Recreation Park car to Hamilton Avenue entrance of County Hospital, and walk north to Iowa Avenue.

Facsimile of one of the full page advertisements appearing in the Fresno papers during the exhibition of the homes.

included in its construction and when completed, it was known as the "Twentieth Century Exhibition of the Home Complete." The wiring was so complete as to make it practically servantless. Especial attention was paid to ventilation and refrigeration as Fresno is exceedingly warm in the summer. A suction fan was placed in the kitchen and the windows are of the disappearing type so as to afford maximum cooling facilities.

In advertising the home, staffers similar to those employed in Long Beach were used. In the newspaper advertising, all of the various electrical interests pooled their resources and all advertising was done over the signature of the California Electrical Cooperative Campaign. A facsimile of one of the full page newspaper advertisements is reproduced herewith.

Electrical firms of Fresno cooperating in the exposition were the Lewis Electric Company, Valley Electric Supply Company, Central State Electric Company, Fresno Electric Company, Electric Motor Shop, Davison Electric Company, B. A. Goodenough, Robinson Electric Company, Wessel Electric Company, Electric Construction Company,

Star Electric Works, J. L. Jones Electrical Works, Independent Electric Company, W-W Electric Shop, and Bellevue Electric Company.

The electrical appliances in each room were as follows:

Living room—Electric piano, electric phonograph and portable air heater.

Dining room—Grill, coffee urn set, toaster, tea samovar, electric portable heater and quad receptacle for dining table.

Kitchen—Electric range, mayonnaise or drink mixer, small size dish washer, 10-inch cooling fan and exhaust fan.

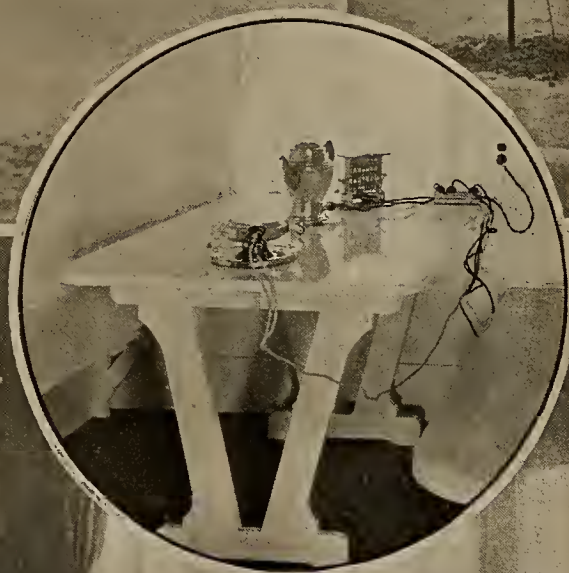
A step hitherto overlooked in the displaying of electrical homes was the securing of cooperation from the automobile industry by allowing a dealer to display a car in the garage of the home. This was done in both Fresno and Long Beach and considerable more advertising secured for the home in this manner.

Electrical contractors and dealers in both cities where homes have been displayed announce that public interest has been aroused in electric appliances and better home wiring methods.



THE dining room of the electric home recently displayed at Long Beach, Calif., by the Electric Club of Long Beach and the California Electrical Cooperative Campaign, is shown in the upper picture. Attention was called to convenience outlets by a small painted hand. The laundry of the home, shown in the insert, was equipped with an electric washing machine, ironing machine and a convenience outlet for attaching hand irons. The designers of the home endeavored to make the kitchen as convenient as possible and every labor-saving appliance was provided. One of the features of this room was the electric dishwasher that was built into the drain-board of the sink. The outlet installed at the end of the sink enables the housewife to attach any of the appliances

THE electrical interests of Fresno, Calif., in conjunction with the California Electrical Cooperative Campaign, displayed the electric home, picture above, in the San Joaquin Valley city, April 12-29. The home was one of four opened to the public in a Better Homes' Exposition held in the Sierra Vista Tract in Fresno. The sunny breakfast nook, as may be seen in the circle to the right, was provided with a duplex convenience outlet so that connections could be made with the appliances without moving from the breakfast table. A view of the dining room looking toward the kitchen is given in the lower picture. The dining table was wired. The home was completely furnished with all appliances by the local dealers.





The booth of the Colin B. Kennedy Company, San Francisco manufacturers.

Radio and Electrical Show Held in San Francisco

Success of Initial Exposition Leads Sponsors to Announce that Event Will Be Held Annually on Pacific Coast

Public interest in radio and electrical devices was aroused to a high pitch in San Francisco during the week of April 2 by the First National Radio and Electrical Exposition held in the Civic Auditorium. It is estimated that more than 25,000 people visited the show during the six days it was in progress.

While the primary purpose of the show was to demonstrate the progress which has been made in the radio industry since its inception, the electrical industry capitalized upon the interest of the public by displaying the latest electrical devices and appliances. The San Francisco Electrical Development League played an active part in making the show a success. This organization maintained an information booth and its committees also participated in the arrangement of the programs.

Those electrical firms which displayed appliances were given a rare opportunity of telling the electrical message to the women visitors whose interest was not primarily in radio. At all times electrical demonstrators were sur-

rounded by groups of women whose male escorts were inspecting radio exhibits.

One of the features of the educational exhibits was that maintained by the California State Association of Electrical Contractors and Dealers. In this booth, which is shown in the accompanying illustration, proper and improper methods of wiring a home were shown. The fire hazard of a carelessly installed wiring system was emphasized by means of samples of work which had been taken from burned buildings. Haphazard installations were compared with more modern types and the dangers of the former pointed out. A modern entrance switchboard was shown while below it was a panel of the type which was installed but a few years ago and with which the public is most familiar. Interested spectators were conducted around the booth by J. W. Redpath, secretary of the Contractors and Dealers' Association, who explained each part of the exhibit in detail. The electrical equipment for a modern

kitchen was also shown, including range, water heater, air heater, house telephone and some of the various appliances.

The programs given each afternoon and evening at the exposition were broadcasted by means of a Western Electric public broadcasting system and were heard by radio enthusiasts in all parts of the Pacific Coast region as the system was connected to KPO, the broadcasting station of Hale Bros.

The Pacific Gas & Electric Company displayed the large illuminated map which is a part of that company's road show.

That radio apparatus can be a part of every home was the message that a number of manufacturers of inexpensive instruments sought to tell the visitors. At one place a self-contained radio set, using but a single vacuum tube and dry batteries, was exhibited. The user of this set had but to attach it to an aerial and connect it to the ground, by means of a water pipe, and he could at once receive radio music and entertainment, the demonstrator stated. Another concern, manufacturing locally, exhibited a simplified head-set, usually one of the expensive items for the radio fan, which contained but a single pole electro-magnet, wound upon a special core of iron, instead of the usual two-pole or horseshoe electro-magnet. This exhibit was one of the many that attempted to make it easy to understand their apparatus by magnifying it. A huge radio receiver, large enough for an elephant, but still made electrically and mechanically duplicate to the smaller standard instrument, made an interesting and instructive study for both the technical experts and the novices.

Among the unique exhibits was a complete switchboard with a connection between a magneto line and a battery line, a complete line of telephone, telegraph and radio apparatus and an exhibit showing the latest broadcasting equipment, recent improvements in connection with marine telephone apparatus and transoceanic communication.

The marked success of the show has led the company which sponsored it to announce that the exposition will be an annual event in the future.



A general view of the First National Radio and Electrical Exposition held in the San Francisco Civic Auditorium during the week of April 2.



THE booth of the California State Association of Electrical Contractors and Dealers at the Radio and Electrical Exposition, showed the old and the new methods of wiring. The display of the Pacific Gas & Electric Company, shown at right, included a map of the territory served by the utility. The Western Electric Company booth is shown below.



Photos by MORTON & Co. S.F.

INDUSTRIAL NEWS



Oregon Power Company Starts Transmission Line Work

The California Oregon Power Company of Medford, Ore., has announced to its stockholders that it has started work on a 66,000-volt transmission line in Klamath County, Oregon, running from Algoma north to Chiloquin. Several crews are in the field working on the new line. It is the plan of the company to complete this line during the month of May. The line is to be 20 miles long and is being built to supply power to the Modoc Lumber Company and other industries in Chiloquin.

The company is also to reconstruct its transmission line from Fall Creek Power House to Yreka, Calif. The line to be replaced is the oldest one owned by the power company and was installed in 1903. The new line will be relocated to make the right-of-way more accessible and easier to patrol.

A new transmission line in the Rogue River Division of the company has recently been completed and is ready to serve the Grants Pass Irrigation District and other users along the line. The line extends from Grants Pass to the irrigation district's pumping plants. The district has four pumping plants, aggregating a capacity of 1,050 hp. The new quarry of the Beaver Portland Cement Company at Wilderville, Ore., will also be served by this line.

The completion of this transmission line has necessitated the reconstruction of the Grants Pass substation. This substation has recently been rebuilt and enlarged.

Nelson, B. C., May Sell Power to Florence Mining Company

Subject to ratification by the rate-payers, the City of Nelson, B. C., has entered into a contract to supply the Florence Silver Mining Company with 600 hp. per year for a period of ten years. The Florence company has signed a contract to take not less than \$5,000 worth of electricity per year, and as a guarantee of good faith is prepared to deposit \$20,000, from which payment for current is to be drawn as the current is used. The mining company agrees to construct a high-tension line from Balfour to the mine, near Ainsworth, a distance of 12 miles, and to turn the line over to Nelson as soon as it is constructed, so that the city may sell power to other mining companies along the route.

Nelson's present power line ends at Willow Point, and in order to fulfill the contract it will be necessary to construct a high-tension line from Willow Point to Balfour, a distance of about ten miles. It is this expenditure that

the city council does not feel justified in making without the endorsement of the rate-payers.

At the present time Nelson has extra power and keeps its strings of glow-lamps burning across the city streets during the daytime rather than go to the expense of installing the necessary switches to cut them off. It has developed a hydroelectric plant at upper Bonnington Falls, on the Kootenay River, capable of providing 4000 hp. The capacity of this plant could be increased should the demand for a greater amount of power occur.

The installation in the plant consists of one 750 and one 1-000-kva. Allis-Chalmers three-phase generators, driven directly by two 2,000-hp. Allis-Chalmers turbines. The current is transmitted at 12,000 volts from the powerhouse to Nelson, a distance of 10 miles, over a two-circuit transmission line.

The Florence Silver Mining Company, which has been in operation for many years and has produced a large amount of silver-lead concentrates, has recently been reorganized. Detroit bankers and manufacturers provided \$450,000 additional capital to aid in the reorganization.

Government Radio Plant May Be Installed at Salt Lake

The United States War Department is completing plans for the erection of what is to be the second largest army radio station in the country. This station will be erected on the Fort Douglas reservation at Salt Lake City, Utah, if present plans are carried out. Robert Loghry, War Department radio engineer, has been in Salt Lake City and has announced that construction on the new station should start within sixty days.

The station is to be one of three for which construction arrangements have been completed. The government plans to use these three stations in conjunction with smaller relay stations to conduct radio communication from one coast to the other with only a small amount of delay.

According to Mr. Loghry, the new station will operate solely on the continuous wave plan system. It will be designed so that broadcast receivers will not be interrupted by the action of the government plant.

The complaint of the town of Kamas, Utah, that excessive rates are being charged by the Kamas Heat, Light & Power Company has been dismissed by the Public Utilities Commission of Utah. The present rate is 15 cents per kw-hr., with a minimum of \$2 per month.

Second Conference Conducted by Columbia Basin League

Nine hundred and eighty-five delegates, coming from three states, assembled at Pasco, Wash., on April 21, at the Second Annual Conference of the Columbia Basin Irrigation League. The attendance this year showed nearly a 100 per cent increase over last year, when 500 men were present.

Large delegations came from the principal cities of the Northwest and the smaller towns sent proportionate numbers. Two of the towns which would receive direct benefit, if the irrigation project is put through, declared civic holidays.

During the meeting speakers expressed confidence in the feasibility of the project of taking water from the Pend Orielle River and delivering it by gravity to the Columbia Basin, where it will be used to irrigate approximately 1,750,000 acres of land. The speakers stated that \$200,000,000 of new wealth will be added to the Northwest every year.

According to E. F. Blaine, head of the Seattle delegation and the originator of the plan, no adverse report has ever been made in regard to the project. Major General George Goethals announced in a telegram read at the meeting that the project is feasible and that he is converted to the plan of reclaiming the now dry area. Dr. Hubert Work, secretary of the interior, telegraphed the opinion that he considered the project a very important part of the interior department's reclamation program.

The United States Government's survey of the project will start in the near future. Congress appropriated \$100,000 for this purpose.

Among the speakers at the conference were: E. F. Blaine of Seattle, C. F. Stinson and E. J. Reynolds of Pasco, Charles Hebbard, trustee chairman of the league, who read the first year's report; Charles Hurley of Tacoma, president of the organization, who stated that work will be started in four years or sooner; Dan A. Scott, Washington state director of conservation; Dr. E. O. Holland, president of Washington State College; Marshall Dana of Portland, Ore., and N. W. Durham of Spokane, who spoke to dispel the fear of overproduction should the new area be supplied with water.

The delegates adopted several resolutions thanking President Harding and teas for the coming year were elected by the group meetings. These men have met and elected officers for the league.

Begin Operating World's Record High Voltage Power Line

Following two years' research work by the engineers of the Southern California Edison Company, and approximately one year's work on the reconstruction of the Big Creek transmission lines for operation at 220,000 volts, the first of the two lines was actually placed in operation at 6:12 a.m., May 6.

The conversion of the Big Creek lines from 150,000 volts to 220,000 volts was brought about by the necessity for additional transmission capacity between the Big Creek water power development and Los Angeles. Operating at 150,000 volts, the Big Creek line as constructed in 1913, had a capacity of 150,000 hp.

sion line for that voltage had never been built before and it remained for the engineers of the Edison company to design a line and method for this voltage. Working in conjunction with Prof. Harris J. Ryan, of Stanford University, the Edison company conducted elaborate tests on various combinations of insulators with and without different types of shielding devices.

They found that by placing a metal ring around the insulator next to the conductor, and by adding two insulators to the string, sufficient insulation could be obtained for 220,000 volts. Supplementing these laboratory tests, a 27-mile section of the Big Creek line was taken out of service and equipped with these shield rings. It was energized

the total load of the station to which it is connected. All switching is done on the 150,000-volt side. Each auto-transformer is supplied with a tertiary winding. These are connected in delta to supply a path for any third harmonic present in the voltage wave, thus avoiding high insulation stress which would otherwise exist.

The work of adding additional insulator units to the line and of installing insulator shield rings has been carried along during the past year. Auto-transformers were purchased and installed at power houses No. 1, 2, Vestal and Eagle Rock. No auto-transformers were required for Power House No. 8 since the step-up transformers at this power house were designed for operation at 220,000 volts. With the recent completion of all this work, the West Big Creek line was made ready for cut-over on Saturday night and Sunday morning, May 5 and 6.

The program was planned to carry out the various steps necessary in the most careful manner. The first step was to change the taps on step-up transformers at Power House No. 8 from 150,000 to 220,000 volts. This work was started at 8 p.m. after the peak load of Saturday night. The auto-transformers at the various power houses and substations were also connected to the West Big Creek line. By 5 a.m. Sunday everything was ready to energize the line. Power House No. 8 was connected to the West Big Creek line. The generator at Power House No. 8 with the West Big Creek line connected to it, was slowly brought up until it was generating at 35 cycles. The voltage on the line was then raised to 200,000 volts.

The second step was to transfer the 30,000-kva. condenser at Eagle Rock, which had previously been running on the 150,000-volt line at 50 cycles, to the West Big Creek line. This was accomplished by disconnecting the condenser and permitting it to coast down to the speed of approximately 35 cycles, at which speed it was connected to the Big Creek line.

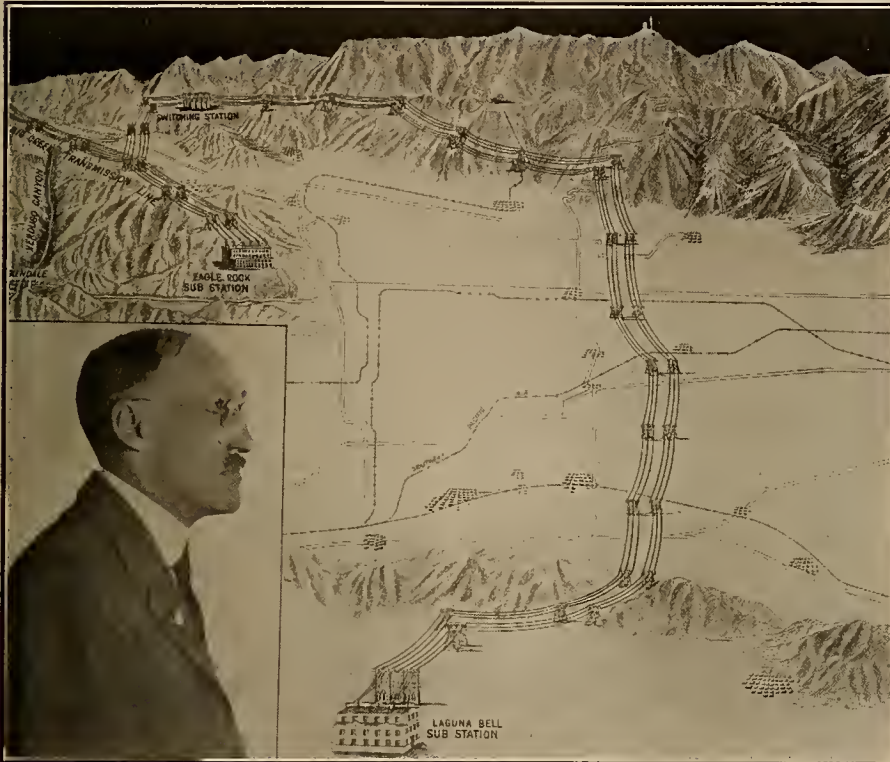
The third step was to increase the speed of the generator at Big Creek No. 8, at the same time adjusting the excitation to maintain 220,000 volts.

The fourth step was to synchronize at Eagle Rock the West Big Creek line with the East Big Creek line and with the general Edison system.

The fifth step was to parallel at Big Creek No. 2, the East and West lines operating at 150,000 and 220,000 volts, respectively. This system of operating was continued during the following week.

On Saturday and Sunday night, May 12 and 13, the same program was carried out to bring the East Big Creek line into operation at 220,000 volts.

The Pacific Gas & Electric Company has applied to the California State Railroad Commission for permission to execute a contract with the Sierra Pacific Electric Company for the sale of power to the latter company for a ten-year period. The tie-in will be made at one of the plants on the Spaulding system. A minimum of \$20,000 worth of energy a year will be bought by the purchasing company during the first five years of the contract.



Artist's drawing of the route of 220,000-volt transmission line recently put in operation by the Southern California Edison Company. The power line connects the new Laguna Bell Terminal Substation with the Big Creek line which connects the Eagle Rock and Vestal Substations and the Big Creek plant. H. A. Barre, executive engineer of the Edison company, is shown in the insert.

In addition to transmitting energy from the Big Creek developments, the Big Creek lines also, during a part of the year, carry the production from Kern River No. 3 from Vestal to Eagle Rock.

With development on Big Creek at the present time generating 135,000 hp. and the Kern River Plant No. 3 producing 42,000 hp., the lines were loaded to full capacity. As the program of 1923 calls for an additional 22,000 hp. in Big Creek No. 1, and 100,000 hp. in Big Creek No. 3, it was necessary to provide transmission facilities for this additional production, either by constructing a duplicate set of 150,000-volt transmission lines, or by reconstructing the present lines for operation at 220,000 volts. After a comparison of the cost of the two plans it appeared that the lines could be reconstructed for 220,000 volts at approximately \$7,000,000 less than the cost of a duplicate set of 150,000-volt lines.

While the electrical manufacturers were willing to construct transformers to operate at 220,000 volts, a transmis-

sion line for that voltage had never been built before and it remained for the engineers of the Edison company to design a line and method for this voltage. Working in conjunction with Prof. Harris J. Ryan, of Stanford University, the Edison company conducted elaborate tests on various combinations of insulators with and without different types of shielding devices.

They found that by placing a metal ring around the insulator next to the conductor, and by adding two insulators to the string, sufficient insulation could be obtained for 220,000 volts. Supplementing these laboratory tests, a 27-mile section of the Big Creek line was taken out of service and equipped with these shield rings. It was energized

This problem was finally solved by installing banks of 150,000 to 220,000-volt auto-transformers at each power house and substation, and not taking 220,000 volts indoors. The auto-transformers are connected solidly in the line. There is one bank for each line, and each bank is capable of carrying

Hood River Hydroelectric Plant Dedicated on May 10

The new hydroelectric power plant of the Pacific Power & Light Company, located near Hood River, Ore., on the Hood River, was formally dedicated by appropriate exercises on May 10. This plant is the largest of the company's power houses and will cost when completed approximately \$1,250,000. It will develop 9,000 hp. At the exercises Lewis A. McArthur, vice-president of the company, was master of ceremonies. A large number of state officials and guests from the other coast power companies were invited to attend.

Contract for Clearing Right of Way Has Been Awarded

Contract for clearing the balance of the right-of-way for the transmission line from West Vancouver to Britannia Beach has been let to J. M. Rolston and H. St. J. Montezambert of Vancouver, B. C. The line is to be built by the British Columbia Electric Railway Company.

The right-of-way is to be 100 ft. wide and the length of the territory to be cleared by the contractors is approximately 23 miles. It is understood that slashing crews will be worked simultaneously from both ends of the line.

The power company plans to follow the clearing crews with construction crews, which will erect poles as quickly as the land is cleared. The contract just placed covers the line between Point Atkinson to Deeks' Gravel Pit, near Britannia Beach. Contract for clearing the right-of-way from West Vancouver to Point Atkinson was let about a month ago.

The line when completed will serve the Britannia Mining & Smelting Company. Contract for about 5,000 hp. of electrical energy was signed by the mining company and the power company last fall.

Construction Work on Columbia Steel Plant Is Started

Actual work on the new plant of the Columbia Steel Corporation at Ironton, Utah, started April 30, when grading contractors set to work excavating for the blast furnace. The Lynch-Cannon Construction Company of Salt Lake City has the contract for grading and excavating and, according to Eugene R.

Wheelon, construction engineer in charge of the work, a large crew of men will be used to hasten the completion of the work.

To provide drainage and a sewerage system for the plant site, P. J. Moran, a Salt Lake City contractor, is using a large number of teams to clean an old drainage canal, which will be used for draining the site. The sewer system will be constructed in addition to this canal.

The Koppers Company of Pittsburgh, Pa., has the contract for erecting the by-product coke ovens and is at present constructing an office near the location of the ovens. The industrial tracks of the steel company are now almost completed and the part needed in the construction work will be ready in the near future.

Washington Power Company Orders Large Turbine

Contract for a 2,500-hp. double runner cylindrical-case reaction turbine has recently been let to the Pelton Water Wheel Company of San Francisco, by the Washington Water Power Company of Spokane, Wash. The turbine is to be designed to operate under a head of 80 ft.

The Washington Water Power Company recently acquired the property of the Okanogan Valley Power Company and the former company is now renewing some of the generating equipment of the newly purchased holdings. The new turbine will be installed at the Similkameen River plant of the smaller company, located at Oroville, Wash.

The new unit will resemble, in general design, the Pelton turbine of the same capacity which is now operating at the plant.

That electric energy may be generated and water used for hydraulic sluicing and recovery of placer grain gold, A. M. Truman of Huntington, Utah, has applied to the Utah state engineer for a water diversion permit. Mr. Truman plans to take 10 sec.-ft. of water from Straight Creek in Garfield County. Three sec.-ft. will be used to generate electric power to be used at Camp Rico in the unorganized mining district of Garfield County, and the other 7 sec.-ft. will be used in hydraulic sluicing. The water which will be used to generate electric power will operate 36-in. wheels.

Oregon Men Place Applications to Use Water for Power

A. P. Gardner of Stayton, Ore., has filed an application to appropriate water from the Umpqua River with the Oregon state engineer. He asks for 1500 sec.-ft. for hydroelectric power development. Mr. Gardner plans to erect a power house 147 ft. long, connecting with dam of concrete, and a bulkhead 360 ft. long. Five timber head-gates, 16x14 ft., will be set in concrete gate bulkheads on the upper side of the power house. The project calls for development of 20,270 hp., at a cost of \$850,000.

J. G. Kelly of Portland has asked for a permit to appropriate 15 sec.-ft. of water for municipal purposes, including domestic and manufacturing use, from the Clear Lake, Edna Lake and Eel Lake watersheds and the water stored in the Clear Lake reservoir. He plans construction of a concrete gateway, sluice gate and 6 miles of pipe line. The project will cost \$100,000.

Electric Club of Seattle Holds Successful Dinner Dance

Members of the electrical industry in Seattle and Tacoma, Wash., put aside all thoughts of business on the night of April 27 and entertained themselves, their wives and lady friends at a dinner dance given at Alderbrook Manor. The purpose of the dinner dance was to get the men of the Electric Club of Seattle and the Electric Club of Tacoma to know each other better.

Approximately 250 persons were present at the resort, which is located about twenty-two miles from Seattle. This number included about thirty contractor-dealers, jobbers and manufacturers' representatives who were delegates from the Electric Club of Tacoma.

The entertainment during the evening consisted of a dinner, which was served at 7 o'clock and followed by dancing. During the evening an excellent opportunity was afforded the men present to make new acquaintances and to renew old ones.

The entertainment committee in charge of the successful affair included: R. M. Cole, Economy Fuse Company, chairman; J. J. Agutter, J. J. Agutter & Company; Fred Block, Pacific States Electric Company; Harry Martin, National Carbon Company; Charles Smutz, Western Electric Company.



Members of the Electric Club of Seattle, the Tacoma Electric Club and the wives and best girls of the members, taken between dances at a recent get-together dinner-dance at Alderbrook Manor, near Seattle.



Night view of the exterior of the first electric home displayed in Loveland Colo., by the owner and the men of the electrical industry.



The home was well supplied with appliances and labor-saving devices, as may be seen in the living room and dining room illustrated above.

Fourth Electric Home Is Displayed in Colorado

Loveland Homeowner Incorporates Complete Electrical Equipment in Home Which Was Visited by 2,300 People

Between 35 and 40 per cent of the entire population of Loveland, Colo., visited the electric home recently exhibited there. The home was open for one week, and during that time 2,300 visitors passed through it and saw how, in the most modern and efficient manner, electricity lightens the housewife's work.

An important feature of the exhibit was the interest taken by the various women's organizations who, through the efforts of Mrs. Anna Duffield, chairman of the woman's department of the Loveland Civic Association, furnished a committee of women for each day the electric home was open to the public. The ladies acted as hostesses.

The house was built by C. A. Williamson as his own home and was designed with a view to making it convenient through the use of electrical labor-savers. Cooperating with the owner were the Western Light & Power Company, the Foster & Kruse Furniture Company of Loveland, which supplied the furniture, rugs, draperies and curtains; the Hines Electric Company, also a local firm, which did the wiring and furnished the fixtures, and various manufacturers of standard electrical appliances.

E. B. Ball, commercial manager of the Western Colorado Light & Power Company at Boulder, Colo., was a strong backer of the local officials of the company.

The display was neatly arranged, with nothing overdrawn. Outlets in walls, baseboards and floors were so arranged as to make for the maximum of comfort and convenience in the use of electric devices pertaining to each room.

The living room contained electric stand and table lamps, electric piano and phonograph and electric gloglog fireplace. The dining room was equipped with electric wired table, serving table and sideboard, with outlets conveniently located; electric fountain, toaster, coffee percolator, waffle iron and electric grill.

The kitchen, which was finished all in white, contained a white enamel electric range, a white enamel dish-washer

and a white refrigerator, electrically operated. There were also the usual kitchen utensils, such as an electric egg-beater and an electric cake-mixer.

The bedrooms and sleeping porch were equipped with electric heating pads, curling iron, hair-dryer, fan and portable dimmer lamp, while in the bathroom were a room heater and an immersion heater. The laundry, in the basement, contained full laundry equipment, including electric iron, washing machine, drier and mechanical ironer.

Visitors were taken through the home in groups, each group in charge of a demonstrator. There was a total absence of trade talk, the demonstrator instead illustrating the operation and usefulness of appliances and, particularly, in answer to questions, supplying information as to the cost of operating the various devices.

Reports from the electrical contractors and dealers in Loveland show that the display of the home brought about a considerable increase in business in the city. All members of the industry feel highly pleased with the results.

Electric Store of Idaho Power Company in New Location

The Idaho Power Company of Boise, Idaho, recently moved its retail electric store into new quarters at 807 Idaho Street in Boise. The new salesroom gives the company considerably more space and provides a display window 41 ft. wide.

The salesroom has been entirely remodeled for the store and new lighting fixtures have been installed so that the interior may be illuminated correctly. Convenience outlets have been installed throughout the store, so that demonstrations of appliances may be made at any time.

The general offices of the Idaho Power Company and the Boise Valley Traction Company will remain in the Electric Building. Offices of the retail store will be located in the building with the salesroom.

Large Electrification Contract Let by Eastern Railway

The Virginian Railway has recently decided to electrify 213 miles of its railway lying between Roanoke, Va., and Mullens, W. Va. Contract for the electric locomotives, power house transformer stations and other apparatus has been awarded to the Westinghouse Electric & Manufacturing Company. The cost of the electrification will be in the neighborhood of \$15,000,000.

The Virginian Railway is electrifying the road to permit it to handle greater quantities of freight. Steam locomotives of the articulated mallet type with twenty driving wheels and four cylinders have been found to lack sufficient power to pull heavy trains over the grades with any speed. Engineers of the railroad have determined that electric locomotives will greatly speed up the handling of freight over the company's tracks.

Industrial activities and community growth in sixteen states of the Middle West, West and South are causing an increase of 39 per cent in the electric power resources of the operated utilities of Standard Gas & Electric Company, according to a new illustrated booklet being distributed by H. M. Byllesby & Company. These companies now supply service to 562,500 customers. Their growth is shown in graphic charts. Air pictures are presented of Minneapolis, St. Paul, Louisville, Oklahoma City, Muskogee, Pueblo, Mobile, Tacoma, Stockton and San Diego.

The British Columbia Electric Railway Company has taken out a building permit for a \$45,000 substation, which is to be built on Bodwell road, between Main and Fraser Streets, in Vancouver. The substation, which will be of the automatic type, will serve all street cars in South Vancouver and north of Broadway automatically during the rush hours of the day.

The city council of Logan, Utah, has asked for a \$300,000 bond issue to improve the present municipal light plant. A. J. Wiley, engineer of Boise, Idaho, has prepared a report on the needs of the city.

Manufacturing Executives Visit Western Cities

Gerard P. Swope, President of General Electric Company, and E. M. Herr, President of Westinghouse, Make Western Tour

The electrical West has been signally honored during the past two weeks by visits from heads of two of the largest electrical manufacturing concerns in the world, E. M. Herr, president of the Westinghouse Electric & Manufacturing Company, and Gerard P. Swope, president of the General Electric Company. Both executives have visited or will visit practically every large city in the West before their return to eastern manufacturing centers.

Mr. Herr spent several days in Denver, where he received his early training in the electrical industry. He next went to Los Angeles, where he addressed the members of the Los Angeles Electric Club on the business outlook of the electrical industry. While in San Francisco he inspected the work which is being done on the new insulator factory which is being erected by the Westinghouse company in Emeryville. Mr. Herr expressed appreciation of the western spirit in developing and using electricity to the utmost advantage by cooperation of the consumer and power company. He was also impressed by the industrial strides which the West is making.

Mr. Swope, who is accompanied by G. E. Emmons, vice-president in charge of manufacturing of the General Electric Company, came to the Pacific Coast via the Southwest. He spent several days in Los Angeles previous to his visit to San Francisco and then preceded to the Northwest. While in San Francisco he addressed one of the largest meetings ever held by the San Francisco Electrical Development League, discussing the strides which have been made by the electrical industry during the past few years. He also emphasized the growing industrial importance of California.

Mr. Swope also addressed a mass meeting of the Oakland Chamber of Commerce. In that city the General Electric Company for the past 13 years has maintained an incandescent lamp factory with a capacity of 25,000,000 lamps annually. The company has recently completed a \$500,000 service shop and high tension switchboard and distribution transformer factory in that city. Both of these plants were inspected by Mr. Swope, in company with Dr. Thomas Addison, Pacific Coast manager of the company, and E. O. Shreve, San Francisco manager.

ditions—the bending of a light ray by the sun's gravitational field—was confirmed by the photographs of the last eclipse of the sun, makes this volume of timely value. Its purpose is to give a general conception of this mathematical theory and its fascinating deductions in terms that may be understood by a student having a knowledge of algebra and trigonometry. In the reviewer's opinion, this purpose has been achieved more clearly and accurately than in any of the other books on the subject yet published. This success is largely due to the fact that the author has such a thorough grasp of mathematics and such unusual ability in expressing his thoughts in understandable form.

The text is arranged as four lectures, which are progressively more specific in statement. The first explains in general terms, by simple physical analogy, that all measurements of motion, space, time and mass are not absolute, but depend upon the condition of observation—the point of view, as it were. Gravitation, like centrifugal force, is shown to be not a real force, but a manifestation of the energy field.

Some of the conclusions drawn from the theory are developed in the second lecture. The old conception of the ether is proven to be contradictory and unnecessary in view of the relativity conception of the energy field. Light and electro magnetism are demonstrated to be not wave motions in the ether, but periodic alternations of energy field in space. Space and time are considered not as independent dimensions, but as part of a four dimensional manifold. The conservation of mass is disproved and mass is shown to be a form of kinetic energy.

The third lecture is devoted to a more rigid analysis of some of these general conclusions. Newton's Law is analyzed as being a first approximation of Einstein's law of gravitation, correct for relatively low velocities. The inadequacy of Euclidian geometry to express the action of centrifugal and gravitational "force" is compared with the more exact statement possible by hyperbolic and elliptic geometry, respectively.

Up to this point the astounding conclusions are reached in an amazingly simple manner. Slightly greater complexity is introduced in the fourth lecture, in which an effort is made to give a conception of the properties of non-Euclidian space in terms of physical space. Stereoscopic pictures are here introduced to good effect, especially in explaining the reason why space may be infinite in terms of Euclidian geometry, but finite in terms of elliptic geometry. The former is shown to apply to space containing no matter, whereas the presence of matter requires elliptic geometry to explain the attendant phenomena.

This brief statement of the revolutionary conclusions reached indicates the contents of this book. It is a text that reveals more with each reading and brings greater conviction as to the soundness of the theory which Steinmetz believes to be "the greatest scientific achievement of the age." The practical value of the theory and of this excellent explanatory text is that it gives a more exact statement and representation of natural phenomena than was possible by the older theories which it replaces.

A. H. H.

Annual Meeting of Engineering Council of Utah Held

The third annual banquet of the Engineering Council of Utah was held at the Hotel Utah in Salt Lake City on the evening of April 23.

John Lyle Harrington, president of the American Society of Mechanical Engineers, of St. Louis, who was the principal speaker, told of the origin and development of organized societies of engineers and of recent gigantic accomplishments of members of the profession. He said that the world began to recognize the engineer during the recent war.

Ignorant criticism of the work of the engineer has prevailed throughout history, according to the speaker. The work has been apparently easy, but of recent years a certain "element of mystery has developed about his work, and with its coming a certain respect for the profession has resulted."

The speaker said that scientific work and research are true functions of engineering societies, but that the engineer is learning his obligation of public service today for the first time. "He is beginning to learn that he has a function beyond serving his employer. Too many, high in public service, do as they are told and have not the courage and vigor to demand the right to do what is right," the speaker said, referring to political abuse of the engineering profession.

Hon. William H. King, United States senator from Utah, paid high tribute to the engineering profession, saying that the engineers, "like Atlas, have borne on their broad shoulders the problems of the world." He, too, scored the political abuse of the profession.

Other speakers of the evening were: Congressman E. O. Leatherwood, Percy

E. Barber, assistant secretary of the American Institute of Mining Engineers; M. D. Williams, senior highway engineer, bureau of public roads, and H. T. Plumb, former president of the organization.

George H. Dern acted as toastmaster. He called attention to the place engineering fills in civilization. He traced development of all foods, clothing and shelter to the profession. He was introduced by Dr. Joseph F. Merrill, dean of the school of engineering at the University of Utah, who is the new president of the Engineering Council.

Several hundred members of the engineering profession, representing many of its branches, were in attendance. The electrical branch of the profession was particularly well represented.

The Secretary of the Interior has authorized the United States Reclamation Service to contract with the Bucyrus Company of South Milwaukee, Wis., for the purchase of two electric driven shovels at a cost of about \$100,000 for use in the McKay dam, Umatilla Irrigation Project, which will cost approximately \$2,000,000.

Books and Bulletins

RELATIVITY AND SPACE

By CHARLES P. STEINMETZ, Chief Consulting Engineer, General Electric Company. 130 pages. 6 by 9 in. Illustrated. \$7. Published by McGraw-Hill Book Company, Inc., New York.

The renewed public interest in the Einstein theory aroused by the announcement by Professor Campbell of the University of California that one of its pre-

Meetings

Program Is Announced for June Convention of N. E. L. A.

The convention committees of the National Electric Light Association have recently sent to members of the organization information concerning transportation facilities and an announcement of the business program of the convention to be held in New York City June 4-8. A reduced fare permit entitling members of the association to a round-trip ticket to New York for one and one-half the regular one-way fare has been sent to all members. Men planning to go from the Pacific Coast will find that the regular summer rates set at \$147.40 will be cheaper than the rate provided for under the special permit.

The business program for the convention will open the afternoon of June 4, when sessions of the Accounting, Commercial, Public Relations and Technical Sections will be held. The first general and executive session will be held on the morning of June 5. Other sessions will be held mornings of June 6, 7 and 8. The Customer Ownership Committee Session will be held on the afternoon of June 7. The Public Policy Committee Session will be held the evening of June 7.

The Accounting National Section Sessions will be held the afternoons of June 4, 5, 6, 7, as will also the sessions of the Commercial National Section and the Technical National Section. The Public Relations National Section Sessions will be held on the afternoons of the first three days only.

All morning sessions are to start at 9:30 and afternoon sessions will convene at 2:15. Convention headquarters are to be at the Hotel Commodore. Members of the association who plan to attend the convention have been requested to send in their registration and hotel accommodation applications immediately.

Promotional Engineering Work Explained to Engineers

At the regular weekly luncheon of the All Engineers' Club, held at the Commercial Club at Salt Lake City, Utah, on May 7, H. K. Strauss, consulting engineer of Salt Lake City, was the principal speaker. Mr. Strauss spoke on the subject of "Fundamentals in Promotional Engineering Work."

He pointed out that the promotional work on practically any large project of any nature is fundamentally that of the engineer, in the making of reports, studying situations, etc. He stated, however, that the engineer should go a step further and investigate the market for the product before making his report on the feasibility of any project from a commercial standpoint. He others for their aid in the work. Trusts should not limit himself to the physical and mathematical factors alone, the speaker said.

In the discussion which followed Mr. Strauss' talk it was suggested that he follow at a later date with more details

on other phases of promotional work of engineers.

Expressions of sympathy contained in a letter written by the Engineering Council of Utah to the widow of Henry W. Adkinson, a prominent mining engineer of Salt Lake City, were read, as were also some of the tributes to his character contained in a newspaper article. Mr. Adkinson's death occurred on May 1.

The meeting was presided over by R. K. Brown, chief engineer of the Salt Lake & Utah Railroad.

New Electric Club Is Organized by Cheyenne, Wyo., Men

Men of the electrical industry in Cheyenne, Wyo., have recently completed the organization of the Cheyenne Electric Club. The association was formed for the purpose of bettering the electrical industry in the Wyoming city. It is the intention of the members to discuss electrical problems and to advise the public in matters pertaining to the electrical industry.

The new club was formed at a dinner held in Cheyenne at which the following men were present: L. C. Phillips, F. W. Fitch, O. L. Moulton, James Cone, T. C. McInerney, C. H. Simpson, George E. Karney, B. U. Young, A. J. Leslie, F. S. Peterson, E. G. Orr, J. R. Padgett, G. M. Brannan, A. C. Jefferis, B. L. Rayor, H. L. Griffin, C. J. Hughes, C. C. Harmon, J. A. Ryan and D. A. LaTorra.

COMING EVENTS

Southwestern Public Service Association—
Annual Convention—Fort Worth, Tex.
May 15-17, 1923

National Electric Light Association—
Annual Convention—New York, N. Y.
June 4-8, 1923

League of the Southwest—
Conference—Santa Barbara, Calif.
June 7-9, 1923

California State Association of Contractors and Dealers—
Annual Meeting—Donner Lake, Calif.
June 9-16, 1923

Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923

Northwest Electric Light and Power Association
Annual Convention—Seattle, Wash.
June 27-30, 1923

Rocky Mountain Division, N.E.L.A.—
Annual Convention—Glenwood Springs, Colo.
Sept. 17-19, 1923

American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Oct. 2-5, 1923

Hetch Hetchy Plant Generators Shipped by Manufacturer

Generators for the Moccasin Creek Power House of the City of San Francisco have been shipped from the factory of the General Electric Company at Schenectady, N. Y. Four units of 20,000-kw. capacity each are to be installed in the municipally owned power house.

The power house, which will house the generating equipment, will be of steel and reinforced concrete. It is planned to have the plant in operation within eighteen months.

Edison Lamp Works Advertising Described to Utah Men

T. J. McManis, manager, department of publicity, Edison Lamp Works of the General Electric Company, was a Salt Lake City, Utah, visitor on April 20 and 21. On the evening of April 20 a dinner was given by the Salt Lake branch of the Edison Lamp Works, at which Mr. McManis was the principal speaker.

Mr. McManis told at this meeting of some of the advertising activities of his company. He spoke of the great field ahead of the electrical industry for the development of business and of the important part which he considered advertising would take in getting this business.

Mr. McManis called attention to the fact that there are now, throughout the United States, five million unwired homes within reach of electric service lines. He gave instances of wonderful results accomplished through magazine advertising, citing several well-known concerns whose business had increased tremendously through this form of advertising.

A large number of Salt Lake City electrical dealers and central station representatives were present and a general discussion, devoted largely to some of the problems of the local lamp dealers, followed Mr. McManis' talk. Ernest L. Dee, who has charge of the intermountain territory for the Edison Lamp Works, presided at the dinner and introduced Mr. McManis.

Convention Held in Los Angeles by Mechanical Engineers

Approximately 200 engineers, many of them from eastern manufacturing centers, assembled in Los Angeles at the three-day regional conference held by the American Society of Mechanical Engineers there April 16-18. The visiting engineers were given an opportunity to hear of the electrical development of the West at the technical sessions of the society held on the mornings of April 16 and 17. Several side trips supplemented the papers that were read.

H. A. Barre, executive engineer of the Southern California Edison Company, presented a paper on the hydroelectric development of his company on the San Joaquin River. J. L. Harrington, president of the society, addressed the meeting, telling of the unusual opportunities of the engineer. Other speakers presented papers on mechanical topics.

On the evening of April 18 a formal banquet was held at the Hotel Alexandria, at which John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, acted as toastmaster. Men high in the society were speakers at the banquet.

Electric vehicle representatives in Los Angeles were the guests of the Electric Storage Battery Company at a dinner on the evening of April 30. H. M. Beck, chief engineer of the operating department of the company, spoke on "Charging and Maintenance of Motive Power Storage Batteries." The dinner at which the men assembled was given at the University Club under the direction of L. F. Boerner, Los Angeles representative of the company.

Personals

G. B. McNair, who is well known in the electrical industry in the Inter-mountain district, has been appointed district illuminating sales engineer for the Denver territory of the Westinghouse Electric & Manufacturing Company. Mr. McNair has had wide experi-



G. B. McNAIR

ence in the electrical field, much of his time having been devoted to lighting and kindred subjects. After graduating from Purdue University in 1908 he was first a draftsman for a consulting engineer, later going to the Wagner Electric Corporation of St. Louis as sales engineer. It has been said that all successful salesmen must be good teachers, for they must be able to make the prospect see the picture as the salesman sees it, so Mr. McNair next became a college professor in electrical engineering, at the same time doing commercial research work for manufacturers of lighting apparatus, largely in the gas field. The lure of commercial work was too strong, however, and in 1918 he joined the ranks of the Western Electric Company of Denver as lighting specialist, where he remained till recently, when he was appointed district illuminating sales engineer for the Westinghouse company. Mr. McNair will devote most of his time to street lighting and his services will be available to any municipality interested in this type of civic improvement.

Roy H. Skill has been named district manager for the Pacific Power & Light Company at Pomeroy, Wash. Mr. Skill entered the employ of the company in 1917 and worked in the Hood River and White Salmon districts in various capacities. He was later transferred to Dayton as lineman, coming from that district to Pomeroy.

G. F. Challoner, head of the financial and sales departments of the China General Edison Electric Company and the International Electric Company of Shanghai, recently arrived in San Francisco from the Orient. Mr. Challoner reports that the outlook for electric business in China was never brighter than at the present time.

Gerard Swope, president of the General Electric Company, visited Denver May 28-29 and was entertained by the electrical and utility men of that city through the Electrical Cooperative League and the Rocky Mountain Committee on Public Utility Information.

Herbert R. Butz, president of the Birtman Electric Company, Chicago, is making an extensive tour of the eight sales districts of the Pacific Coast territory which are under the direction of H. J. Gute. Mr. Butz expresses himself as being highly impressed with the market opportunities in this territory for all classes of electric appliances.

A. M. Jackson, Rocky Mountain district representative for the Locke Insulator Company, with headquarters in Salt Lake City, has been transferred to the Chicago office of the company. Mr. Jackson, it will be remembered, was general chairman of the Electrical Exposition held in Salt Lake City last fall.

A. L. McCarthy, vice-president and general manager of the Eureka Vacuum Cleaner Company, addressed the members of the Los Angeles Electric Club at a recent meeting of that organization on the subject of "Vacuum Cleaner Sales." Mr. McCarthy is making a tour of the Pacific Coast region in the interests of his company.

Dr. Edward P. Hyde, who organized the Nela Research Laboratories of the National Lamp Works in 1908 and who for the past few years has occupied the position of director of research for this department of the General Electric Company, has tendered his resignation to take effect June 30, 1923. Dr. Hyde, who has been active in scientific and technical affairs for many years, has decided to take a long rest abroad. He will retain his office as president of the International Commission on Illumination until the plenary meeting of that organization in this country in 1924.

Willis T. Batcheller, Seattle consulting engineer, addressed the April meeting of the Seattle Section of the American Institute of Engineers on the subject of "The Columbia River Project." Mr. Batcheller spent seven months making an exhaustive survey for the State of Washington in conjunction with the United States Reclamation Service, on the feasibility and possibility of reclaiming the large tracts of land in the Columbia River basin and at the same time developing large blocks of power for industrial use.

Carl Whitmore, division superintendent of plants at Portland, Ore., for the Pacific Telephone & Telegraph Company, has been made division superintendent of installations for the Western Electric Company with headquarters in San Francisco. Mr. Whitmore was a member of the class of 1908 at the University of California.

George E. Baxter has been made traffic superintendent of the Pacific Coast division of the Radio Corporation of America. Mr. Baxter, who began his radio career as a ship wireless operator, was in charge of the Hillcrest Station at Daly City, Calif., for three years prior to the outbreak of the war when he entered the navy. In his new position he will have charge of all radio work of the corporation on the trans-Pacific circuit, including Hawaii and Japan and also all marine traffic. He will direct the operations of the new station just completed at Los Angeles.

James J. Foreman, veteran employee of the Pacific Power & Light Company at Sunnyside, Wash., has been appointed to take charge of the dam and headworks at the recently completed \$1,500,000 Hood River hydroelectric plant. Edward Fewel, who has been with the company for 20 years, has been appointed chief operator of the plant.

H. B. Squires, president and manager of H. B. Squires Company of San Francisco, with an office in Los Angeles, spent several days in the latter city recently making a survey of local business conditions.

E. M. Herr, president of the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., was a recent Los Angeles visitor. Mr. Herr is on a tour of inspection of all the Pacific Coast district offices of his company and remained only a few days in Los Angeles, but while there found time to deliver an address before the local Electric Club on manufacturing conditions in the electrical industry and the trade relations existing with the Orient.

J. B. Pomeroy, western representative for the Rome Wire Company, with headquarters in Los Angeles, is a recent San Francisco visitor.

J. O. Case, formerly local sales manager of the Los Angeles office of the General Electric Company, has just been appointed assistant local manager of that office. Mr. Case has had a very interesting career with the General Electric Company and is one of the most popular executives in the electrical industry in southern California. He graduated from Throop Institute of Technology, now California Institute of Technology, in 1902. In 1905 he went to Schnectady, where he took the student's apprentice course as offered by the General Electric Company at its main works and has been with the company since that time. Mr. Case was



J. O. CASE

local sales manager of the Los Angeles office for two years prior to his present appointment and for eight years prior to that time was manager of the supply department of the local office. Mr. Case is an active member of the Electric Club of Los Angeles, being a member of the executive committee for the present term; he was secretary-treasurer for the year 1922-1923 and for the year 1921-1922 was a member of the executive committee.

L. A. Blackburn, formerly with the Erner Electric Company, jobbers of Cleveland, Ohio, and more recently with the Electric Railway & Manufacturers' Supply Company of San Francisco, has joined the merchandising division of the San Francisco office of the Westinghouse Electric & Manufacturing Company. Mr. Blackburn will cooperate with the electrical dealers in the East Bay and Sacramento Valley districts.

M. H. Henock, formerly with the Electric Railway & Manufacturers' Supply Company, has joined the San Francisco office of the Westinghouse Electric & Manufacturing Company as range specialist.

H. W. Allen, sales manager, Graham-Reynolds Electric Company, Los Angeles, has just recently completed an extensive business trip to all of the cities in the southern California territory, making a survey of the electrical business in the interest of his firm.

H. S. Bastian, assistant engineer of the Portland Railway, Light & Power Company, has resigned to take charge of the new Portland district office of Charles C. Moore & Company. He received his technical training at Bucknell University, Pa., where he received B. S. and E. E. degrees. Leaving the East he entered the employ of the Southern Pacific Company at San Francisco, where one year was spent as draftsman in the signal department. The following four years were spent in Portland as chief draftsman and field engineer in the signal department of the Oregon-Washington Railroad & Navigation Company, a part of the Union Pacific System, where his time was devoted to the solution of electrical and mechanical problems involving signal systems, pumping plants, signal power plants, etc. For a year before entering the employ of the Portland Railway, Light & Power Company Mr. Bastian was engaged in private prac-



H. S. BASTIAN

tice, chiefly mechanical and power plant work. In 1919 he became assistant engineer of the power company, and in 1921 assistant construction engineer in charge of the steam plant efficiency work, in which capacity he continued until leaving recently to take up his new duties with Charles C. Moore & Company. One of his first tasks in his new office will be in connection with the new Long-Bell Lumber Company plant at Longview, Wash.

J. M. Curtin, manager of the industrial department of the Westinghouse Electric & Manufacturing Company, East Pittsburg, Pa., is a recent Pacific Coast visitor.

H. H. Argabrite, telephone department manager of the Western Electric Company in Denver, is a candidate for councilman at the city election which will be held there shortly.

W. B. Sawyer, Jr., of the United States Steel Products Company; H. F. Yost, Pacific Coast manager of the Trumbull Electric and Manufacturing Company, and A. W. Copley, special representative of the Westinghouse Electric & Manufacturing Company, all of San Francisco, were recent Los Angeles visitors and were guests at the Electric Club luncheon during their stay.

J. M. Barry, former chief of the department of electricity of the city of San Francisco, and later distribution engineer for the Great Western Power Company, has been made division manager of the Southern Division of the Alabama Power Company, with headquarters at Montgomery. Mr. Barry was formerly assistant chief engineer of the company, engaged in the construction of the Mitchell Dam project.

John E. Loiseau, for the past eight years secretary of the Montgomery Development & Water Power Company of Montgomery, Ala., has been appointed to the office of secretary of the Denver Gas & Electric Light Company, to succeed C. N. Stannard, who was made vice-president and general manager some time ago. Mr. Loiseau has been connected with the Doherty interests for a number of years. Before going to Alabama he was with public utilities in Ohio.

Bertrand Smith of Elk River, Idaho, is now connected with the Seattle office of the Westinghouse Electric & Manufacturing Company as outside engineer of the service department.

Harry L. Harper, Los Angeles district manager of the Western Electric Company, is a recent San Francisco visitor.

E. B. Criddle, general agent of the Southern Sierras Power Company, who has recently been named vice-president of the utility, is a recent San Francisco visitor.

H. M. Byllesby, president of H. M. Byllesby and Company, Chicago, recently inspected the Pacific Coast utilities operated by that company. He spent several days in Stockton, where he visited the American River development of the Western States Gas & Electric Company.

J. B. Tuberger, Pacific Coast manager of the Eureka Vacuum Cleaner Company, spent several days in Los Angeles conducting a sales campaign in connection with E. M. Harvey, sales manager, Woodill and Hulse, local electrical jobbers, and their distributors in this section.

Hobart D. Betts, vice-president and treasurer, Thomas and Betts, New York, manufacturers of conduit fittings, connectors, etc., recently spent several days in Los Angeles and southern California going over this territory with their local representatives, the H. B. Squires Company. Mr. Betts is on a tour of inspection of Pacific Coast cities and expects to visit all the principal cities on the coast before returning to New York.

Obituary

Rex C. Starr, noted Pacific Coast engineer, was found dead on May 3 in the Lake Yosemite-LeGrand Canal of the Merced (Calif.) Irrigation district. All of the circumstances concerning Mr. Starr's death are not known, but a note found with his hat and coat on the



REX C. STARR

bank of the canal leads to the belief that he took his own life while suffering from a nervous breakdown. He was chief engineer and executive head of the Merced Irrigation District, which had just completed the canal; a member of the firm of Thebo, Starr & Anderton, construction engineers of San Francisco, and consulting engineer for the San Joaquin Light & Power Corporation. Mr. Starr had been connected with many important power developments on the Pacific Coast during recent years. After being graduated from the University of Michigan in 1907, he practiced for a time in Detroit, coming West in 1909. For some time he was associated with Stone & Webster in Seattle, holding the position of resident engineer on the construction of the 10,000-kw. Snoqualmie Falls plant and later on the White River plant of the Puget Sound Power & Light Company. He acted as assistant superintendent of construction on the Big Creek project of the Pacific Light & Power Corporation and later held the position of hydraulic engineer with that company, and later with the Southern California Edison Company. Mr. Starr spent another brief interval with Stone & Webster as superintendent of construction on projects in the Northwest, and in April, 1919, accepted a position as chief engineer with the San Joaquin Light & Power Corporation, where he directed the Kerckhoff and Kern Canyon power projects, being retained as consulting engineer by that company when he accepted a position with the Merced Irrigation District a year ago. Mr. Starr was 38 years of age. His tragic death was a great blow to the engineering fraternity.

C. B. McDonnell, for the past five years district sales manager at Victoria for the British Columbia Telephone Company, died at St. Joseph's Hospital, Victoria, April 30, 1923.

Manufacturer, Dealer and Jobber Activities

The Johns-Pratt Company of Hartford, Conn., manufacturers of Noark fuses, meter service and protective devices, cutout bases, fuse accessories, vulcabeston packing and insulating parts, and Johns-Pratt molded insulation, have established an export division with office at 30 Church Street, New York City. E. Wilhelm Droosten and W. L. Urquhart, who have had extensive experience in handling export business of electrical manufacturers, will be in charge of this division.

The Whitmore Electric Company, recently organized as a manufacturers' representative and succeeding the Lallie-Whitmore Company, 1637 Court Place, Denver, Colo., has announced representation of the following lines in the Rocky Mountain region: Sweeper-Vac Manufacturing Company, Grinnell Washington Machine Company, Moe-Bridges Company, Hart & Hegeman, and the Domestic Motors Company. R. F. Whitmore is the general manager.

The Master Lighting & Fixture Company, Auburn, Wash., has been incorporated for \$40,000 by F. T. Jenks, A. F. Netzel, C. C. Hayes and A. F. Anderson.

The Northwest Washer Company, 213 Pine Street, Seattle, Wash., an exclusive washing machine store, has been opened by Russell Brooks, formerly of Des Moines, Iowa.

The Cheney Light & Power Company, Cheney, Wash., has been awarded contract for electric work on the proposed new dormitory for men at the Washington State Normal School.

The Lapp Insulator Company, Le Roy, N. Y., has recently issued Catalog No. 3. This booklet contains a short treatise upon the manufacture of insulators, giving an idea as to how Lapp insulators are manufactured. The tests given insulators are described. A complete listing of the several types of insulators manufactured by the company is made in the catalog. Diagrammatic specifications and illustrations of the insulators are presented. Special porcelain pieces manufactured by the company are illustrated in the catalog.

The General Electric Company recently announced reductions in list prices on substantially all types and sizes of Mazda B and Mazda C lamps. The reductions became effective May 1. The prices will average a general reduction of about 10 per cent. Improvements in manufacturing methods have been assigned as part reasons for the reductions. The desire to enable dealers to get customers into the store for lamp purchases is also given as a reason. The reduction is the third since April, 1922.

The Edison Electric Appliance Company, Chicago, Ill., has recently placed on the market an attachment which when placed on the waffle iron, made by the company, turns the appliance into a pancake griddle. The pancake attachment fits snugly on the surface of the waffle iron and heats rapidly. The company has also started the manufacture of a new toaster tray.

Schweitzer & Conrad, Inc., manufacturers of high voltage protective and switching equipment of Chicago, Ill., have recently published Bulletin No. 222. The bulletin is entitled "Indoor Equipment." The booklet contains a description of all of the company's forms of high voltage indoor equipment, including fuse mountings, single and double throw disconnecting switches, fused switches and choke coils. Various combinations of these devices are also described and illustrated. The company has also issued Bulletins No. 200, 201, 202 and 204, which deal with fuses, fuse cutouts, high tension equipment and lighting arresters, respectively. The company manufactures a complete line of these devices.

The Square D Company, Detroit, Mich., has put on the market a new line of switches which embody a radical change in safety switch design. The new switch design provides for separate bases for each line terminal, switch blade and fuse clip. Each of these is mounted on a separate base of molded composition instead of being grouped on a common base of slate. The individual base makes it possible to remove any part from the front of the switch in a few minutes without disturbing the wiring. The new base reduces the weight of the switch about 25 per cent.

Altorfer Brothers Company, Peoria, Ill., recently shipped a consignment of A. B. C. washing machines to A. A. Wilson of Los Angeles, Calif., the retail value of which was \$400,000. Forty box cars were used to transport the shipment from the factory at Peoria to Baltimore, Md. From Baltimore the shipment moved by boat through the Panama Canal to Los Angeles harbor. The trainload of washers leaving the Altorfer factory makes the fifth one that the company sent out on single orders.

Announcement has been made to the electrical trade of the Rocky Mountain region by the Mountain Electric Company in Denver, of its removal to 1433 Lawrence Street.

The Atlantic-Pacific Sales Company, San Francisco, Calif., formerly the Atlantic-Pacific Radio Supplies Company, has announced that the change in name was brought about by the change in policy of the company. This company has extended the field which it serves and is now conducting a general jobbing business of electrical equipment. Among the men who have recently joined the sales organization of the company are: E. M. Cutting; A. S. Kedzie, who will handle the Bissell cleaner line; A. E. Carroll, who will be assigned to the line of Rutember heating appliances; R. J. Noel and G. F. Hall.

A motor driven bell striker has been placed on the market by the Electric Automatic Appliance Company, 1749 Arapahoe St., Denver. The device has two hammers which are thrown out by centrifugal force and will strike on the rim of the bell at each revolution and rebound. P. A. Brown is the inventor.

The Walker Electric Company, one of the principal retail electric supply houses of Salt Lake City, has moved into its new home at 15 East Broadway. The former location of this firm was at 159 South State Street.

The Hendrie & Bolthoff Manufacturing & Supply Company of Denver has been appointed Rocky Mountain distributor of the Royal vacuum cleaner by the P. A. Geier Company of Cleveland. The new arrangements will not conflict with the present exclusive retail representation in Denver by the Denver Dry Goods Company, it is understood. Representation of the Line Materials Company is also announced.

The F. W. Wakefield Brass Company of Vermilion, Ohio, manufacturers of "Red Spot" lighting specialties, recently brought out a ceiling unit which is specially adaptable for kitchens and bath rooms. This addition to the "Red Spot" line is finished in white enamel and is designed for use with any glassware. With 150-watt daylight mazda lamp the unit has proven especially popular and efficient for lighting kitchens.



When this picture of the officers of the Electric Club of Seattle was taken the men whose likenesses are reproduced above were not thinking of volume, sharp pencils nor bank balances. This undoubtedly explains why they all look like "regular fellows." The men are, from left to right, front row: Fred Larkin, director; George Reiniger, vice-president; J. J. Agutter, past president; W. E. Jones, president; S. G. Hepler, director; second row, Frank Cooley, director, and Rush McCarger, secretary.

Trade Outlook

San Francisco

During the month of April the number of building permits issued in San Francisco declined slightly, but the value of the permits increased over those issued in March. Nine hundred and fifty-four permits, for buildings valued at \$5,173,801, were issued during April while the value of the buildings covered by the 977 permits issued in March was \$3,229,572.

Despite the small drop in the number of permits issued, trading in real estate in the city continued active. Sales were made at prices which tended to be higher than they have been in the past. Building costs continue to remain firm, with a possibility of becoming higher.

Electrical dealers and jobbers have reported that prices are higher than they were at this time last year, in some cases being as much as 20 per cent over last year's list. Business is reported as being fairly active, the continued building program acting as a stimulant to the market. Contracting companies are kept busy on new and repair jobs.

General business conditions reflect activity. A large spring business was had by most industries and retailers are changing their stocks preparing for a steady summer season. Price advances have been reported in textiles and general household furnishings.

Seattle

Strenuous efforts on the part of the I. W. W. organization to call a general strike in the lumber mills and logging camps of the Pacific Northwest has largely failed. Only a small number of workers responded to the call, the men who did being confined almost entirely to the logging camps. Meanwhile, lumber production continues heavy, with practically all the mills cutting in excess of their output a year ago. Mills in the Inland Empire district are, in many instances, operating night shifts to keep up with the demand for lumber products.

Reports from eastern parts of the state indicate that a bumper wheat crop may be expected, and that all crops are in excellent condition. Prices are expected to be sufficient to insure a fair profit for this year's crop, and farmers are encouraged over the present outlook.

Seattle is sharing in the generally better conditions which prevail in building lines, and has a particularly satisfactory labor situation as compared with other localities. All kinds of building work are under way and the residence construction is expected to be unprecedented in the city during the summer.

Electrical dealers and jobbers in Seattle and the Puget Sound district report a very encouraging outlook for the summer. The volume of trade transacted so far this year is said to show a 25 per cent increase over that

for last year. Local men are confident that the summer and fall months will show good returns in sales volume.

There is a slightly increasing demand for protective apparatus to guard plant equipment against injury from electrical storms occurring occasionally in the fall and winter months. While these storms are infrequent, the loss sustained is sufficient to warrant protection.

Salt Lake City

With farmers now receiving what they believe is a fair profit on the crops that have been held over from last season, and the excellent planting weather of the past few weeks, the outlook for the farmers for the coming season is very encouraging. Practically all of the wool crop has been sold, and it is estimated that in Utah alone the value of this year's wool crop will be in the neighborhood of \$6,500,000.

Mining conditions continue to be exceedingly good, and increased industrial activity is noted throughout this territory.

In Salt Lake City building permits issued during April, 200 in number, represent a large increase over the same month of 1922.

Electrical jobbers report a continued increase in business, with bright prospects for the balance of the year. Contractor-dealers are fairly busy on account of the opening of the building season. Since the drive on washing machines has subsided to a considerable degree, vacuum cleaners have been moving to quite an extent. The coming summer is expected to produce good results in the sale of electric ranges.

There are many indications of money being easier, and the general outlook is very encouraging.

Denver

The upward movement of trade and industry in this district since the beginning of the year, has been sustained during the spring season. The volume of wholesale and retail trade exceeds that of last year. Manufacturing is proceeding at an exceptionally high rate.

Sales of electrical supplies continue to gain, distributors reporting an increase in volume of about 30 per cent since the beginning of the year as compared with the same period in 1922, with an increase of about 20 per cent in dollars and cents. Prices are increasing on large motor equipment and advances on small equipment are expected at any time. Copper in all forms, excepting possibly switches, continues to advance in price.

Increases due to demands for building construction equipment will continue if the present new building program continues without abatement in Denver. Excepting May 1922, the month of April

just passed broke all building records. A total of 784 permits were issued with a valuation of \$2,225,100, which brought the total value since the first of the year up to \$6,437,950 as compared to \$4,621,300 for the same period in 1922. April permits exceeded those of the same month last year by nearly a half million dollars.

Portland

The Portland district appears from many strong indications to be well started on a period of great business activity. Reports for April of this year show the following substantial increases over March of this year: bank clearings 19.1 per cent, postal savings 9.6 per cent, building permits 34 per cent. Residence construction continues brisk, being about 50 per cent of the total building.

There is an upward tendency to costs of construction which is undoubtedly affecting the volume to some extent, but the record for the present year is expected to pass that of 1922, which was the highest in the history of the city.

In the lumber industry there is very great activity with mills running extra shift in an endeavor to keep up with orders. Production is about 30 per cent above normal and prices remain firm. Shipments are going to all parts of the country and to foreign countries as well. About 40 per cent of the cut is moving by water.

The wool market is strong and active. It is estimated that 75 per cent of the 1923 Oregon clip has been sold by the growers and at good prices.

Los Angeles

Los Angeles building total for April was \$15,352,944, which represented the issuance of 5,094 permits, while for the same period of last year the number of permits issued was 3,983 with a valuation of \$12,959,686. This represents an increase of about 20 per cent.

Bank clearings for the month of April amounted to \$558,567,539.65, which compares with the same period of 1922 with \$400,290,325.60 as an increase of approximately 40 per cent.

Prices of electrical supplies and wiring devices in this section are remaining firm, but the price of conduit and rubber covered wire has increased, while there has also been an increase in some styles of motors.

The Southern California Internal Revenue District, with headquarters in Los Angeles, reports the total of \$1,072,588 collected as admission taxes from motion picture theaters, for the first quarter of 1923, as compared to \$890,543 for the same period in 1922.

These increases are but representative of the increase and expansion in all lines in Los Angeles and southern California and the electrical industry through the building program is obtaining its fair share of the increase.

The election of May 1, in which a spirited contest was conducted on the part of the electric railway companies as opposed to motor buses, was decided in favor of the electric railway systems.

Construction News

Bridges

Calif., San Francisco—Contract for the construction of the transbay bridge from Coyote Point to Mount Eden has been awarded to the Coast Construction Company of San Francisco. The cost is estimated at \$10,000,000. It will be necessary to have plans and specifications approved by the War Department and surveys are under way. Bayley Hopkins is president of the Coast Construction Company.

Ore, Salem—Contract for the construction of a bridge on the Columbia River highway over the Lewis and Clark River between Astoria and Seaside has been awarded to the Pacific Bridge Company of Portland on a bid of \$170,000.

Wash., Olympia—State Highway Commission recently awarded contract for reinforced concrete bridge over the Touchet River, on the Inland Empire Highway, between Waitsburg and Dayton, to the Colonial Building Company, Spokane, on their bid of \$14,820. Contract for constructing steel bridge and concrete approaches over Koch Slough on the Pacific Highway, near Silvana, Snohomish County, was let to C. C. Snyder Company, Seattle, for \$23,228.

Wash., Chehalis—C. L. Graves of Spokane, on a bid of \$29,572, received contract for construction of a 220-ft. steel bridge across the Chehalis River near Claquato. His bid provided for wooden stringers.

Wash., Kelso—The Cowlitz County Commissioners will erect a new steel bridge, 200 ft. long, to replace the Manna bridge over the Toutle River, recently condemned.

Wash., Everett—Snohomish County Commissioners have approved plans for the proposed \$35,000 bridge to span the Stillaguamish River at Arlington, and plans will be presented to the State Highway Commission for final approval, preparatory to calling for bids.

Highways

Colo., Denver—Contracts for six highway projects in various portions of the state, costing an aggregate of \$130,000, were let by the state highway commission, following approval of the projects by Governor William E. Sweet. The contracts are for gravel surfacing, grading and the building of two bridges. The six projects follow: Crushed rock surfacing of three and one-half miles of road in Mount Vernon canon, \$34,000. Gravel surfacing of two miles of road between Craig and Meeker in Nine-Mile Canon, \$31,000. Gravel surfacing of three miles of road between Kremling and Meeker, \$28,000. Grading and drainage of three miles of road east of Coventry in Montrose County, \$10,000. Bridge across Box Elder Creek, east of Watkins in Adams County, \$15,000. Bridge across Cherry Creek, near Melvin, in Arapahoe County, \$15,000.

Idaho, Blackfoot—Bids for the construction of unit B, federal aid road project No. 61, were opened at the offices of the county commissioners, showing Gline & Shaffer low bidders at \$23,103.75. Unit B is a 4½-mile stretch of the Yellowstone Highway between Wapello and Firth. It will be built of crushed gravel and will complete the only section of unimproved highway between Blackfoot and Idaho Falls. It is an extension of a 13½-mile contract now under construction by the same contractors. Work is to be completed by Aug. 1.

Wash., Olympia—Contract for grading 8.7 miles of the Olympic Highway, between Agnew and Port Angeles, Clallam County, has been let to K. L. Goulter & Company, Ilwaco, at

\$181,664.97. Contract for grading 6.9 miles of the Pacific Highway, Bellingham to Ferndale, in Whatcom County, let to John Ottison & Co., Inc., Seattle, on their bid of \$67,371. Contract for grading and graveling 4.2 miles of the Sunset Highway in King County, Preston to Falls City, was awarded to Dowell & Clarke, Seattle, for \$76,000. Contract for paving 4.85 miles of the Sunset Highway, from Spokane County line to Reardon in Lincoln, was let to C. M. Payne of Spokane for \$161,503. All of above contracts awarded by the state highway commission.

Wash., Spokane—Highway improvements totaling \$802,000 in North Idaho have been approved as follows: Lolo Pass Highway, 30 miles, \$482,000, all government funds; Bonners Ferry Road, 8 miles to Montana line, grade and surface, \$105,000; Fourth of July Canyon, 22.4 miles, surfacing, \$100,000; Weeksville-Thompson Falls Road, grading, \$85,000.

Wash., Seattle—King County commissioners will receive bids until May 28 for grading and graveling of the Coutts Road, estimated to cost \$15,000.

Wash., Olympia—Contract for paving 4.47 miles of Pacific Highway in Cowlitz County, Neals to Toledo, was recently let to Goetz & Brennan on their bid of \$141,278. Contract for paving 3.07 miles of the Sunset Highway from the Wenatchee bridge north was let to Yakima Paving Company of Tacoma on their bid of \$99,435. Contract for clearing, grading, drainage and surfacing with crushed rock of about 6.9 miles of Inland Empire Highway between Colville and Meyers Falls in Stevens County was let to Mitchell Bros. of Spokane on their bid of \$43,963.

Wash., Walla Walla—Contract for grading and surfacing with crushed rock of 9.63 miles of Permanent Highway No. 28, Lower Waitsburg Road, was recently let to H. L. Wilson of Walla Walla, on his bid of \$52,792.

Wash., Chehalis—Contract for hard-surfacing one and one-half miles of the Lewis River Highway has been awarded to Swanson & Co., Portland, on their bid of \$23,000.

Wash., Tacoma—Pierce County has awarded to J. H. Collins, Spokane, contract for paving of 2.8 miles of Permanent Highway No. 19, Wilkeson to Carbonado, on his bid of \$62,951.

Irrigation Projects

Mexico, Sonora—Quinton, Code & Hill, consulting engineers, Hollingsworth Building, Los Angeles, Calif., are preparing plans for a diversion dam and irrigation project to be constructed in the State of Sonora, Mexico, by the Richardson Construction Company, as owner, Van Nuys Building, Los Angeles. The dam will be constructed at the junction of the Yaqui and Moctezuma rivers, and will be planned to raise the water 10 ft. This dam will be 3,300 ft. long, 12 ft. high and 125 ft. wide. The structure will be of rock fill with concrete paving on top. The main works will be built on sand and gravel foundation, while the headworks will be on rock base. The project will involve considerable canal construction. The dam and other work will provide irrigation for approximately 600,000 hectares. The approximate cost of the work is \$1,000,000. The Southern Pacific is building a branch line connecting with the main line giving rail facilities for construction purposes and an outlet for the land.

Wash., Spokane—The North Spokane Irrigation district has awarded J. C. Broad the con-

tract for labor and water mains required in connection with the development of the project at \$51,000. Bonds of \$75,000 have been authorized and a portion of this sum will be used for required pumping equipment.

Wash., Vancouver—Bids on the Washougal diking project, the second largest ever attempted in Clarke County, will be called June 1, according to Walter Schwarz, county engineer, who is preparing specifications. Estimated cost of the drainage is \$120,000.

Power Projects

Wash., Seattle—Contract for clearing section 14 of the right of way for the 10-mile transmission line from the Gorge Creek Plan of the Skagit project to the city of Seattle has been let to Besoloff & Brice, Seattle, for \$38,880.

Wash., Seattle—The supervisor of hydraulics, Marvin Chase, Olympia, has received application from the Superior Portland Cement Company of Seattle for water appropriation for a large hydroelectric power project to be installed on Jackman Creek in King County. Plant will cost approximately \$175,000, and a pipe line 2.37 miles long will be built.

Wash., Woodland—The Puget Sound Power & Light Company, which recently purchased the properties of the North Coast Power Company in Vancouver, plans extension of power line from Woodland to Vancouver to supply current to the street car lines, now supplied by the Portland Railway, Light & Power Company.

Railways

Calif., Los Angeles—The engineering department of the Los Angeles Railway Company is preparing plans for a new shop unit to be erected at 54th Street and South Park Avenue. It will be 100x400 ft., brick and steel construction and will cost about \$150,000. Plans are also being prepared for a new car barn of similar construction.

Idaho, St. Maries—Fred S. Herrick, St. Maries, Idaho, will construct 80-mile logging railroad, costing \$1,000,000, for the purpose of hauling logs from a 67,400-acre tract of land purchased from the government for \$4,000,000. Road will be standard gage and 40 miles will be completed during 1923.

Wash., Spokane—Improvement work costing \$170,000 is contemplated for this year by the Spokane International Railway. The biggest item will be rebuilding of a tunnel north of Bennero Ferry, which will cost about \$75,000. Line work will also be done.

Streets and Sewers

Calif., Huntington Park—At a special election held recently a sewer system was voted on favorably by a large majority. Bonds to the amount of \$250,000 are to be sold.

Calif., Pasadena—Work will start at once upon erection of \$500,000 sewage disposal works at the City Farm. Eighteen tanks, 275 ft. long, 68 ft. wide and 18 ft. deep, will be built.

Calif., Pasadena—City directors are planning to draw up resolution of intention calling for the construction of the northwest sewer system and for the Linda Vista sewer system and for the outfall sewer to be built in the Arroyo Seco, from Brookside Park to California Street. Cost, \$112,000.

Calif., Long Beach—The city council of this city has authorized sewer and storm drain work and paving contracts in the Belmont Shore Place, a subdivision on the eastern end of the city along the beach front. The Two-Miracle Concrete Corporation was awarded the contract, the cost of which will total approximately \$450,000. James F. Collins is chief engineer in charge of the Belmont Shore project.

Calif., Long Beach—The Butte Electric Manufacturing Company, Pacific Electric Building, Los Angeles, was awarded the contract at \$45,-

548 for constructing an ornamental lighting system on Pine Avenue from Ocean Blvd to 14th Street.

Calif., Long Beach—Butte Electric & Manufacturing Company, 445 Pacific Electric Building, Los Angeles, has been awarded contracts for constructing ornamental lighting systems in the following streets: Anaheim Street, between Temple and Loma Avenues, at \$17,875; Pine Avenue, between Ocean Blvd. and 14th Street, at \$45,548.

Utah, Provo—Mullen & Palm have been awarded contract for the paving of Second South Street from University Avenue to First East Street, and the curbing of both sides of First South Street from Fifth West to Fifth East; the east side of Fifth West Street from Center to Third South; Second West Street from Center to First South, and First and Second East Streets from Center to Third South, all of which is designated as Paving District No. 16 and Curb and Gutter District No. 7, respectively. This firm's bid on the street paving was \$4075 and \$37,518.31 for the curb and gutter.

Wash., Seattle—Contract for paving Findlay Street et al, estimated to cost \$37,000, was let to Coluccio & Erickson, 517 22nd Avenue South, Seattle, for \$43,030. Paduano & Company, 646 West 51st Street, Seattle, on a bid of \$31,532, received contract for concrete sidewalks on Atlantic Street. Contract for paving Union Street with concrete has been let to J. L. Smith, Pioneer Building, for \$40,548. Low bid for paving of 24th Avenue North, et al., was submitted by C. L. Creelman at \$22,786. Low bid for constructing a tunnel under the Duwamish Waterway on First Avenue South was submitted by R. L. Sparger, Colman Building, at \$107,582. The work involves sinking shaft, 137.5 ft.; driving tunnel 400 ft.; shaft lining, 400 cu. yd. concrete; tunnel lining, 500 cu. yd. of concrete. One of the largest improvement districts in Seattle will be formed to meet the expense of a new sewer system for district between Snoqualmie Street on the north and Myrtle Street on the south, in the Duwamish Water district. Work is estimated to cost \$300,000.

Wash., Kelso—City council has approved the engineer's estimate of \$39,543.14 for paving of Oak, Grade, Third, Fourth, Fifth and Academy street here, and call for bids will be issued shortly.

Wash., Kelso—On a bid of \$55,323.02 the United Contracting Company of Portland received the contract for paving Cowlitz Avenue with 2-in. bitulithic on a 4-in. crushed rock base.

Wash., Kelso—Contract for installation of sanitary sewer system for the new town of Longview has been let by the Long-Bell Lumber Company to Bardsen & Company of Butte, Mont. Contract for the storm sewer installation, involving 26,000 cu. yd. of excavation and laying 39,000 lin. ft. of pipe, was let to J. D. Hanley, of Portland. Contract for concrete sidewalks and curbs has been awarded to Bonnell & Savage, of Tacoma. The work will cost \$500,000, and is the first unit in the proposed \$4,000,000 paving program outlined for the city. This unit involves 180,000 sq. yd. of concrete paving, and several thousand feet of concrete sidewalks.

Wash., Everett—Paving of Pacific Avenue, from Chestnut to Wetmore Avenue, at an estimated cost of \$75,000, is proposed by the city council. District includes 14 blocks.

Waterworks

Calif., Alhambra—City commission has decided to submit to city voters a bond proposition amounting to \$349,000, comprising the following items: \$250,000 for water department

extensions and betterments; \$75,000 for the fire department; \$12,000 for storm protection; and \$12,000 for city yards. A resolution of intention to call the bond election has been adopted.

Idaho, Boise—Charles H. Helmer, contractor of Boise, has been awarded the contract for the construction of 30 miles of water system from Sage Springs into Rawlins, Wyoming.

Wash., Kelso and Longview—Construction of a water system for these two cities in Cowlitz County is to begin. The right of the appropriation of the waters of the north and south fork of Goble Creek, a tributary of Cowlaman River, has been granted. The project involves an expenditure of approximately \$663,000. The main project is that of the south fork, which is to cost \$600,000; 7.9 miles of pipe line will be required and the hydraulic fill dam will be 90 ft. high, with a length of 500 ft. on the top and 35 ft. at the bottom. This estimate includes drainage provisions for both projects. The north fork project requires 1.1 miles of pipe line and will take a dam 80 ft. high and 400 ft. long on top and 40 ft. long at the bottom. This cost is estimated at \$63,445. Present requirements are estimated at 15 to 30 sec.-ft., and 40 sec.-ft. in the future.

Wash., Odessa—This city has voted \$12,000 to pay for the construction of a concrete reservoir to replace present wooden tanks.

Wash., Camas—This city has filed application with the state supervisor of hydraulics asking appropriation of the waters of the Little Washougal River, for establishment of a municipal water system. Plant proposed will cost \$156,000, and will require a pipe line $7\frac{1}{2}$ miles long.

Wash., Centralia—The city of Centralia has been granted a permit to divert 7 sec.-ft. of water from Mitchell Creek for the purpose of augmenting the municipal water supply. The construction of a 2-mile pipe line and concrete dam will cost about \$30,000.

Miscellaneous

Calif., San Francisco—A. D. Kern of Portland, Ore., has been awarded contract by the government for reinforcing and extending a jetty 300 ft. at Humboldt Bay and for the completion of a breakwater at Crescent City, at a cost of \$300,000 and \$200,000, respectively. Col. Herbert Deakdyne is chief engineer for the government in that district.

Calif., San Bernardino—Inland Oil Refinery Company, recently incorporated, will erect an oil refinery on West Rialto Ave. The plant will be erected in units, the first of which will cost approximately \$100,000. The directors include Jefferson G. Crawford, of Los Angeles.

Utah, Salt Lake City—Stock Yards—Extensive improvements, including a new office building and extensions of stockyards, are planned at the Salt Lake Union Stockyard, to cost approximately \$85,000. Thomas Austin is president of the Stockyard Company and J. H. Manderfield, general manager.

Wash., Tacoma—Gas Plant—Construction of a gas plant to cost \$250,000 will be started very soon by the Tacoma Gas & Fuel Co., a subsidiary of the Standard Gas & Electric Company. The new plant will be erected on the site of the present plant and will double the capacity of the present tanks.

Buildings (Industrial)

B. C., Vancouver—Reports announce plans for pulp and paper mill costing \$8,000,000 to be erected in North Vancouver, are nearing completion in the offices of the Seamon Paper Company of Chicago. It is stated new mill will have capacity of 250 tons daily and will employ 1,000 people.

Calif., Los Angeles—Frank D. Chase, Inc., engineer, 533 Title Insurance Building, is preparing plans for a 6-story, class A industrial building to be erected on Dowley Road, Central

Manufacturing District for Los Angeles Central Manufacturing District. Reinforced concrete construction, 6-story* and basement, U-shape, 260 x 160 x 140 x 80 ft., 10-story tower, brick exterior walls, terra cotta trim, concrete and maple floors, composition roofing, tower to contain 150,000-gal. water pressure tank, freight and passenger elevators, club rooms for employees, sprinkler system, steel sash, rolling steel doors; \$750,000.

Calif., Pasadena—E. D. Taylor, 539 S. Pasadena Ave., Pasadena, has the contract at \$34,008 for erecting the new 1-story warehouse on S. Broadway, Pasadena, for the Crane Company. Cyril Bennett, 600 Security Building, Pasadena, architect. Mill construction, stucco exterior, foundation 144 x 148 ft., 3-in. wood floors, offices, storerooms, shipping platform, pipe sheds, fencing.

Calif., Los Angeles—Bavin & Burch Company, 173 E. Jefferson Street, was awarded the general contract at about \$110,000 for erecting a 2-story and mezzanine story automobile building on Figueroa Street near Pico Street, for J. A. Graves. Morgan, Walls & Morgan, 1124 Van Nuys Building, architects. Dimensions, 100 x 155 ft.

Calif., Los Angeles—Architect A. C. Martin, 431 Higgins Building, is preparing plans for a 4-story and basement class A warehouse to be erected at Grand Avenue and 35th Street for the May Corporation. Reinforced concrete flat slab construction, 200 x 250 ft., composition roofing, cement floors, steel sash, 4 elevators, electric, steel rolling and metal doors, wire glass, basement 12 ft. deep; \$400,000.

Calif., Los Angeles—Ashley & Evers, 58 Sutter Street, San Francisco, have prepared plans for a 5-story class A warehouse to be erected on Factory Place, near Alameda Street, for Dohrmann Commercial Company, 436 S. Broadway. Dimensions 135 x 150 ft., reinforced concrete construction, stucco exterior, steel sash, composition roofing, metal skylights, elevators, equipment, steel rolling doors; \$180,000.

Colo., Lafayette—Work has been started on the main building of the factory of the Interstate Manufacturing & Roofing Co., the products of which will be slate-surfaced shingles and flat roofing material. Construction of the building and installation of machinery will require six months and will cost about \$200,000. Harry S. Allen of Denver is president and general manager and George E. Bermont of this city, treasurer.

Ore., Portland—The contract for the addition to the Braly Motor Car Company, at 14th and Burnside Streets, was awarded to E. B. Gudhart, 986 Garfield Ave. The addition is to be 50 x 100 ft., 2 stories, concrete and tile, elevator—to cost \$25,000.

Ore., Salem—Cuyler Van Patton has prepared plans for a 1-story concrete cannery building with basement, which Van Patton & Son will erect at Trade and Liberty Streets for the Northwest Canning Company. The size of the building is to be 96 x 148 ft. and will cost \$40,000, and with the machinery complete will amount to \$100,000.

Ore., Reedsport—A new sawmill will be constructed in East Reedsport, adjoining the platted section of the city, costing in the neighborhood of \$250,000, and will have a capacity of 75,000 ft. daily. J. H. Austin of Reedsport made the announcement.

Ore., Portland—Camp & DuPuy have prepared plans and will erect a two-story warehouse and office building on East Washington Street near East 2nd Street for C. W. Nottingham, at a cost of \$35,000.

Wash., Washougal—The buildings and equipment recently destroyed in the \$100,000 fire at the Washougal Woolen Mills will be replaced by modern buildings and machinery.

Buildings (Miscellaneous)

Calif., Alameda—School—A bond issue of \$750,000 was voted at a recent election here to be used for the construction of a high school.

Calif., Vacaville—School—Contract for the construction of the Vacaville Union Grammar School has been awarded George Barenchi, Vallejo contractor, at a cost of approximately \$75,000.

Calif., Venice—Club—Architects Norenberg & Johnson, 401 L. A. Realty Building, have prepared preliminary plans for a class A club building to be erected on Ocean Front Avenue near Park Street, Venice, for the Oceanic Club. J. E. Hall, secretary. It will be 5-story and basement, 60x120 ft., reinforced concrete construction; \$200,000.

Calif., Los Angeles—Hotel—Architect Harold Cross, 1132 Merchants National Bank Building, is completing plans for a 6-story Class A hotel building to be erected at Francisco Street and Potter Park Place for Frank G. and E. H. Jansen. Reinforced concrete construction, 90x100 ft., cast stone and face brick exterior, marble and tile lobby, comp. roofing, elevator, tiled baths, steam heating system, fire escapes, O. P. trimmings, 120 rooms, 85 baths, 120 toilets; \$150,000.

Calif., Los Angeles—Hotel—Architect H. W. Charlton, 333 San Fernando Building, has completed plans and is taking segregated bids for the erection of a 4-story class C hotel building at 1043 W. 6th Street, for H. A. Strange; 106 rooms each with bath; lobby and restaurant. Cost, \$1,000,000.

Calif., Los Angeles—Offices—Architects John Parkinson and Donald Parkinson, 420 Title Insurance Building, are preparing plans for a 12-story and basement class A office building, to be erected on Flower Street, near 8th Street, for the Los Angeles Gas & Electric Corporation. It will be 120 x 143 ft., and probably of steel frame construction. Cost, \$1,000,000.

Calif., San Pedro—Apartments—Architect L. L. Jones, 603 Grosse Building, is preparing plans for a 4-story, Class C store and apartment building, to be erected at San Pedro for L. De Carlo. Brick 4-story and basement, pressed brick facing, composition roofing, steel beams, plate glass, metal sash, steam heating system, tile baths and drainboards, wall beds, electric elevator, ornamental iron, cement, hardwood and O. P. floors, staff; will contain 4 stores, lobby and 81 rooms, divided into 40 apts.; \$150,000. Leased to Casson & Whitton.

Calif., San Francisco—Apartments—W. L. Growall is planning the immediate construction of an apartment building to cost approximately \$500,000 at the southwest corner of Larkin and Chestnut Streets. Plans have been prepared by Wm. Knowles.

Calif., Sacramento—Hospital—W. C. Keating was the low bidder for construction of the Sisters' Hospital, to be located at 35th and J Streets. His figure was \$398,800. R. A. Herold, architect.

Colo., Denver—School—Hospital—Alex Simpson of Denver has been awarded contract for the construction of the new state medical school and general hospital building for the University of Colorado. The estimated cost of the two buildings is \$983,000.

Colo., Denver—Apartments—Permits have been issued for the construction of two four-story apartment houses, each to cost \$300,000, by the Marion and Cecil Holding Companies of this city, for which W. N. Bowman is the supervising architect. Concrete for electrical work have been awarded to J. Fischer.

Colo., Denver—School—Excavation work for the new \$100,000 Barnes Commercial School at Fourteenth and Glenarm Streets will be started shortly by the C. S. Lambie Construction Co. of this city. Fisher & Fisher are the architects.

Colo., Pueblo—Lodge—Plans for the erection of a business block on the site of the old opera house, destroyed by fire several months ago, have been set aside as the result of a purchase of the property by the Scottish Rite Shrine Building Association, on which will be built a shrine temple to cost \$700,000. The new building will include an auditorium to accommodate 1400 persons, ball and banquet rooms, in addition to commodious business quarters on the Main Street side of the building.

Colo., Denver—Hotel—A 12-story hotel with 600 rooms, to be located at Eighteenth and Broadway, has been announced by Edward S. Goldstone, head of a local investment company. It will be financed by an eastern concern for operation by a nationally known hotel company. E. H. Noorman of this city is the supervising architect.

Colo., Denver—Church—An addition to Temple Emmanuel, which will double the size of the building, is to be erected shortly at a cost of \$200,000, according to Rabbi William S. Friedman.

Ore., Portland—Bank—Plans for a \$40,000 building to house the Coos Bay National Bank of Marshfield, Ore., are being prepared by Tourtellote & Hummel. Plans are to be completed about June 1 and construction will start soon after.

Ore., Portland—School—Contract for general construction of the new Chapman School was awarded to Hilmer J. Stettergren; \$203,495.

Ore., Forest Grove—Dormitory—Pacific University is to add a \$50,000 dormitory for boys. The new building is a result of a gift of \$100,000 to the college. The building will be three stories and basement and will accommodate about fifty students.

Ore., Portland—Apartments—An \$80,000 apartment house is to be built at Denver Street and Watts Avenue for Sarah E. Parshall. The building will be of Spanish Mission style, of concrete construction and finished in stonework; will contain 22 apartments. John H. Grant is the architect.

Ore., Astoria—Offices—A \$250,000 four-story building is to be constructed on the block on 12th Street between Commercial and Duane. This is the largest building project announced for Astoria since the fire, and is to be built by Fred Warren and C. R. Higgins of Astoria and Charles Niemi of Seaside.

Ore., Astoria—Lodge—R. R. Bartlett, architect, has prepared plans for a \$40,000 Masonic Temple to be erected at 16th and F Streets. The building is to be 3 stories in height, 60x80 ft. in size and will be built of reinforced concrete, and will be devoted entirely to Masonic purposes.

Ore., Salem—Residences—Lawrence & Holford of Portland are planning a residence for F. A. Livesley, local hop dealer, which will cost approximately \$65,000. It will be built on Fairmount Hill and will be of the old English Manor type with landscape grounds. The same architects are also preparing plans for a \$25,000 residence for Clifford Brown of Salem.

Ore., Tillamook—School—The general contract for the construction of the grade school here has been awarded to Hedges & Hulls of The Dalles on their bid of \$68,757. The plans were prepared by A. E. Doyle of Portland and call for 16 class rooms, one-story, tile walls, rough plaster exterior, trimmed with terra cotta with tile roof.

Ore., Marshfield—Bank—The Coos Bay National Bank will start the erection of a \$60,000 bank building on the corner of Central Avenue and Second Street. Tourtellote & Hummel of Portland drew the plans, which call for a 2-story concrete structure with a white enamel finish in artistic design.

Wash., Seattle—Apartments—Hudson & Lorentz, contractors, will construct a new apart-

ment structure, 3 stories and basement, of brick and concrete, 111x120 ft., to cost \$150,000, at Second Avenue and Battery Street.

Wash., Chehalis—Apartment—Contract for the H. A. Kaufman apartment, to be built here at a cost of \$85,000, has been let to Squires & Russell, Chehalis.

Wash., Snohomish—School—Snohomish School District has voted a bond issue of \$80,000 to be used in constructing a new high school. Structure will be two stories and basement, 92x107 ft., of brick.

Wash., Seattle—Hotel—Eight contracting firms, six Seattle concerns, and two eastern companies, have been selected to submit bids on the proposed \$3,000,000 Olympic Hotel to be erected here by the Community Building Company. Northwest fir is specified in the specifications.

Wash., Seattle—Church—The First Presbyterian Church, Rev. M. A. Matthews, pastor, plans the construction of a \$1,000,000 Bible Building, adjoining the present church structure. The building will be 9 stories high, 110x130 ft. in size, and of concrete and steel construction. A feature of the building will be the electrical laboratory and radio station. The present radio station is to be greatly enlarged.

Wash., Vancouver—Lodge—Contract for the construction of the Knights of Pythias home has been awarded to Parker & Banfield of Portland on a bid of \$99,800.

Wash., Seattle—Offices—Sound Engineering & Construction Company here received the contract for erecting Bigelow Building at a cost of \$250,000. Building will be 60x120 ft., 8 stories high, of pressed brick and terra cotta.

Wash., Seattle—Offices—Contract for adding 5 stories to the Century Building, Third and Pike Streets, has been let to Murdock & Eckman, Seattle, on a bid of approximately \$100,000. The addition will be of concrete and steel, and will provide an 8-story structure.

Wash., Aberdeen—Hotel—Washington Hotel Company has authorized A. H. Albertson, architect, Seattle, to proceed immediately with plans for proposed 5-story steel and concrete hotel, 130x100 ft., containing 125 rooms, to be built in Aberdeen.

Wash., Seattle—Apartments—Contract for a 4-story masonry apartment building, to contain 32 apartments, has been let by M. Riberg to J. Hokanson, contractor, 3626 Wallingford Avenue, at a cost of \$60,000.

Wash., Seattle—Mausoleum—Pacific Mausoleum Association, American Bank Building, has commissioned Architect Andrew McQuaker to prepare plans for a \$100,000 mausoleum of reinforced concrete, 183x62 ft. in size.

Wash., Seattle—Apartments—A. F. Mowat, Arcade Building, has received contract for a 5-story, \$100,000 masonry apartment house, to contain 51 apartments and three retail stores, and to be erected by J. F. Fleming.

Wash., Everett—Hospital—Plans for the proposed 5-story steel and concrete hospital building, costing \$300,000, to be erected by the Sisters of Charity of the House of Providence, are under way by Architect John Graham, Seattle, and bids will be called for shortly.

Wash., Seattle—Homes—Gardner J. Gwinn, realty operator, has purchased a large plot of ground in the Roosevelt School district, on which he plans the erection of 180 homes, ranging in cost from \$5,000 to \$8,000, and representing an expenditure of \$1,000,000.

Wash., Seattle—Market—The Westlake Building Company will erect a two-story and basement, reinforced concrete and mill construction building, containing 60,800 ft. floor space, and costing between \$90,000 and \$100,000, at Westlake and Virginia Street.

Wash., Seattle—Office—Campbell Lumber Company plans erection of an \$85,000 store and office building, two stories high, which will eventually be eight stories high and cost \$250,000.

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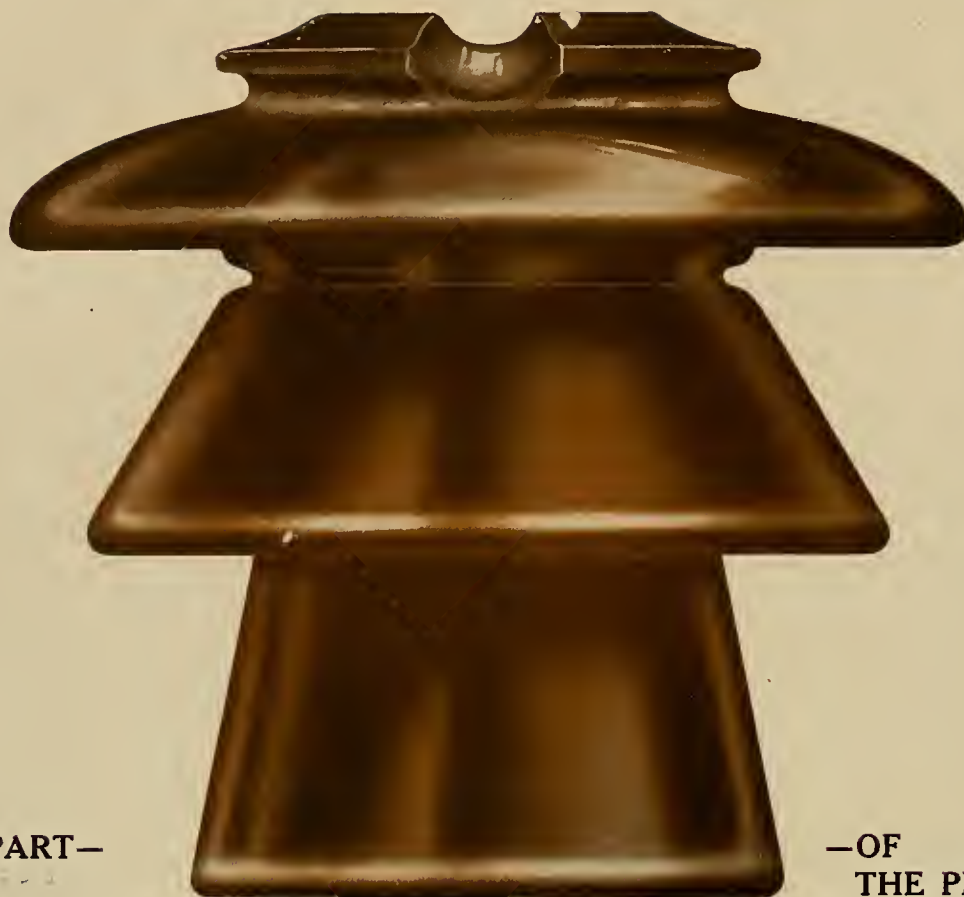
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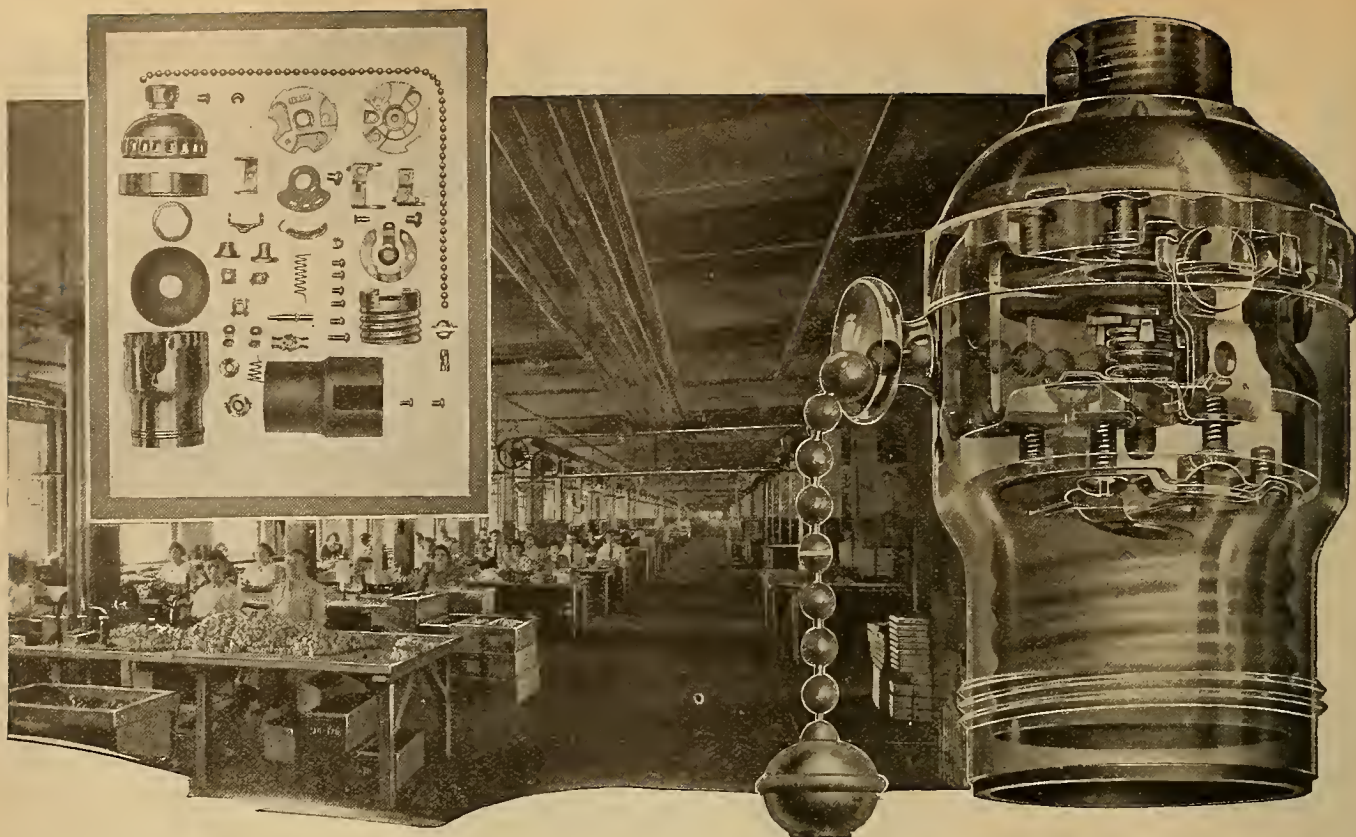
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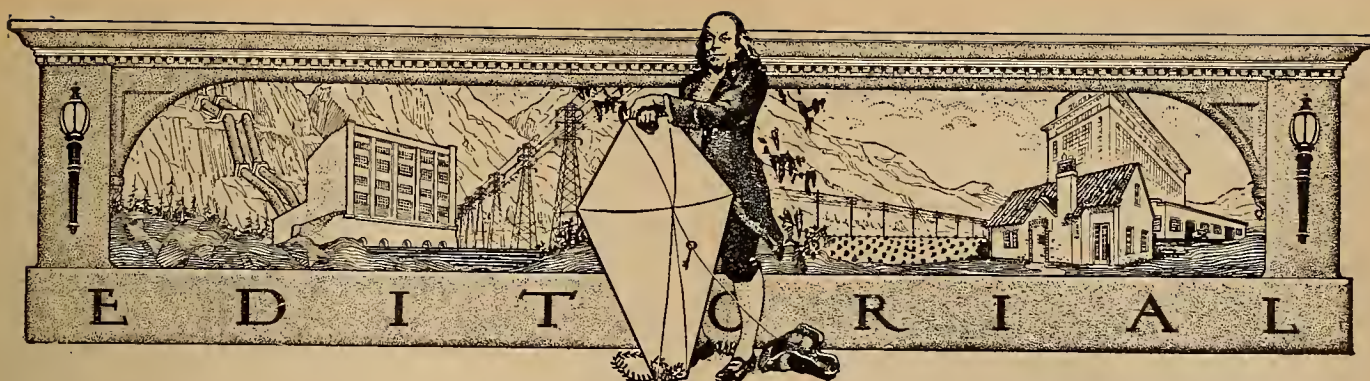
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Recording a Year of Electrical Progress

PAPERS to be presented before the annual convention of the Pacific Coast Electrical Association at the Fairmont Hotel, San Francisco, June 19 to 22, occupy the major portion of the greatly enlarged editorial section of this issue.

THE discussions cover a wide range of subjects, and present an accurate cross-section of the most advanced thinking in the development of the generation and application of electrical energy to the service of mankind. Accounting, commercial, technical and public relations, broadly represent the elements covered so forcefully and clearly by the many committees of specialists who have given so generously of their time and experience that all may benefit thereby.

WHILE, fundamentally, the discussions center about the central stations as the foundation upon which the electrical industry of the West is erected, the information given is no less valuable to every link in the chain of electrical service, to every man engaged in the application of electricity for any purpose. To the man who is not content to skim over the surface in a superficial way, but who has the desire to dig down to the very root of things electrical, the opportunity of benefiting through the service rendered by the Pacific Coast Electrical Association cannot be overestimated.

MUCH of the advanced thinking in the electrical field has originated in the Western States. In many particulars, the region west of the Rockies is better devel-

oped electrically than any other section of the United States. Thus, the papers and discussions appearing in this issue, representing as they do the critical analyses of men who have placed the West on the electrical map, have an interest and importance that transcends a mere locality, great though it is. They are of national, even international interest, and, as such, richly merit the careful study of our readers. The quality of the papers "reflects the painstaking research, careful weighing, analytical penetration and discriminating contacts of fine minds exceptionally equipped by native capacity and practical experience to formulate and express opinions that thinking men find worth reading."

THE publication of these papers in the Journal of Electricity and Western Industry prior to the dates of the convention at once affords an opportunity to all members of the Association to study the subject matter offered that they may be prepared to participate in the discussions; it brings the convention to those who are so unfortunate as to be unable to attend, and it brings to all readers of this paper the privilege of participating to this extent in the benefits of membership.

IN this editorial, we have used the term "thinking men." It is to them that the world in which we live owes its material and moral progress, and it is to them that this issue is dedicated.

Supreme Court Decision of Great Importance to Power Progress

A decision of great importance to electric power development in the West is that of the Supreme Court of the United States which has recently dismissed the petition of the City of Los Angeles for a rehearing of the city's case for condemning property on the Owens River in California. The decision denied the right of the City of Los Angeles to condemn certain lands for municipal purposes on the Owens River, owned by the Southern Sierras Power Company and used by that company in supplying power to cities in the southern part of California.

The Supreme Court decision ends a controversy which has been in progress since February 1920. The first decision handed down by the United States District Court, granted the city a right to condemn the property. The power company appealed to the United States Circuit Court and on Nov. 5, 1922, that body decided that no showing had been made that the public use of a municipal corporation was more necessary than that of a utility, privately owned, and serving other cities, reversing the decision of the lower court. The appeal to the Supreme Court was made by the city and the dismissal made by that body ends the legal battle.

Throughout the series of suits, several cities have linked with the power company in its fight against Los Angeles. Riverside and San Bernardino, two of the cities served by the power company, had legal representatives working with the legal department of the company in fighting the suits.

The decision affects power development all over the West, for, if the decision had been in favor of the City of Los Angeles, it would have been possible for a municipal corporation not only to acquire by condemnation proceedings, property within its limits, earned but also service rendered by that public utility operated. Thus municipal corporations could obtain property of privately owned companies at will and thereby not only cripple the public utility concerned but also service rendered by that public utility to other communities and municipal corporations other than the one seeking to condemn.

"Make Toast Your Breakfast Food" Campaign of Bakers' Association

THE American Bakers' Association is now engaged in launching before the baking industry and the consuming public a national toast campaign. The campaign has as its object the placing of an electric toaster on the breakfast table of every wired home in order that the baker can sell more bread to be made into toast. The possibilities opened to electrical dealers, power companies and toaster manufacturers is readily apparent, since an increase in demand for toasters will result from the efforts of this movement.

Twelve toaster manufacturers have already cooperated with the Bakers' Association who "found thirty different toasters on the market, all designed by electrical engineers who had never seen a slice of bread, apparently." Many of the toasters were crit-

icized by the American Institute of Baking for faulty design from the bakers' and consumers' point of view. As a result of a conference between research engineers of the bakers and the electrical manufacturers, baking knowledge was brought into close contact with electrical knowledge and there are now seven types of toasters on the market that "deliver the goods" as compared with three before this research was undertaken.

"Baking Technology," the journal of the Bakers' Association, comments on these tests as follows:

"The quality of toast the different toasters turned out varied as much as the quality of bread one might buy in a large city. One supplied such intense heat that the bread burned before it toasted.

"Another left a blank strip a fourth of an inch wide along the bottom of the slice of bread. Only a very few of the toasters would take the bakers' standard loaf of 24 ounce size. Some made good toast along the bottom but burned a strip along the top. One toasted the bread evenly, but did it so slowly that it dried out before it toasted.

"And then there was the best one on the market. It toasted the bread evenly, brought it up with a fine color. It took the pound and a half loaf slices, and had a device for turning the toast that always worked well except for very thick slices. With these facts determined, it was ascertained just why each toaster fell away from the ideal. Suggestions were made to the manufacturers. Most were acted upon."

An advertising campaign is being worked up in which manufacturers of electric current, of electric toasters, "of butter which is never spread so thick, to such good advantage as upon toast, and of bread, will all combine to popularize toast for breakfast" and to push the sale of splendidly designed low-cost toasters on which to make this toast in the most convenient way.

Electric Development of Europe Proceeding at Rapid Rate

THE scarcity and high price of coal in all the countries of the world have led to a rapid increase in the use of water power. In the United States this increase is shown by the greater activity in the development of the great potential powers of the Colorado, Columbia, and St. Lawrence rivers. Progress in actual construction is shown by the horsepower of the projects for which licenses have been issued by the Federal Power Commission. The proposed turbine capacity of projects under construction for which licenses were issued in 1921 and 1922 was 1,500,000 horsepower. This capacity includes only that of projects on public lands and public reservations or navigable streams.

In Europe the high cost and scarcity of coal, especially in countries importing it, have been an even greater incentive to the utilization of potential water power. Hydroelectric power is used mostly in the cities for lighting and for industrial use, but two tendencies of development in Europe that are evident to a less extent in this country, are the extension of electrical transmission lines to serve the

farming districts and the electrification of the railroads.

In the United States the electrification of the rural districts, according to reports received by the Geological Survey, is proceeding normally through the extension of transmission lines from cities and towns to surrounding areas. In the West settlers on some irrigation projects are supplied with power from plants operated in connection with the irrigation works.

Although the United States exceeds every other country in the mileage of steam railways that have been electrified (1,600 miles), the electrification of railroads is now proceeding more rapidly in Europe than in this country.

Failure of Colorado Compact Halts River Development Plans

PENDING a settlement of the deadlock resulting from the failure of all of the states involved to ratify the Colorado River Compact, the Federal Power Commission has decided to defer for the present consideration of all applications affecting the Colorado River. Prominent among these applications are those of the Utah Power & Light Company for a project on the Green River at Flaming Gorge in northern Utah and the Girard project on Diamond Creek in Arizona.

Arizona is the only state which has not ratified the compact. The House and the Senate of its legislature both sought to annex reservations but could not agree on what the reservations were to be, and the legislature adjourned without further action. One of the reservations desired by the Senate was to the effect that there should be paid into the Treasury of the State of Arizona a tax of \$5 per annum for every horsepower of electrical energy developed. The legislature of Arizona will not meet again until November, 1924. At the present time the Colorado River question is the most prominent public issue in Arizona. Sentiment is divided between those favoring Arizona's ratification of the compact as it stands and another group favoring state development of the river.

There are many difficulties standing in the way of the latter procedure. One is the fact that a provision of the constitution would prevent the state laying claim to title to public lands or Indian reservations. The Glen Canyon site, which would be the most likely to be suggested for development under such a plan, includes public domain and Indian reservation lands. In addition the actual dam site has been reserved as a power site under the jurisdiction of the Federal Power Commission.

If the Federal Power Commission continues its announced policy of granting no licenses until a settlement of the pact controversy by ratification, Arizona will no doubt ratify the pact. It would appear that a ratification of the pact will not be detrimental to Arizona. It will undoubtedly be the most important step yet taken in the development of the Southwest and will avoid a generation or more of litigation

by defining at the present time the rights upon which public and private capital may be invested, and will lift the embargo now retarding the development of the entire Colorado River Basin.

Definite Criteria Upon Which to Base the Extension of Credit

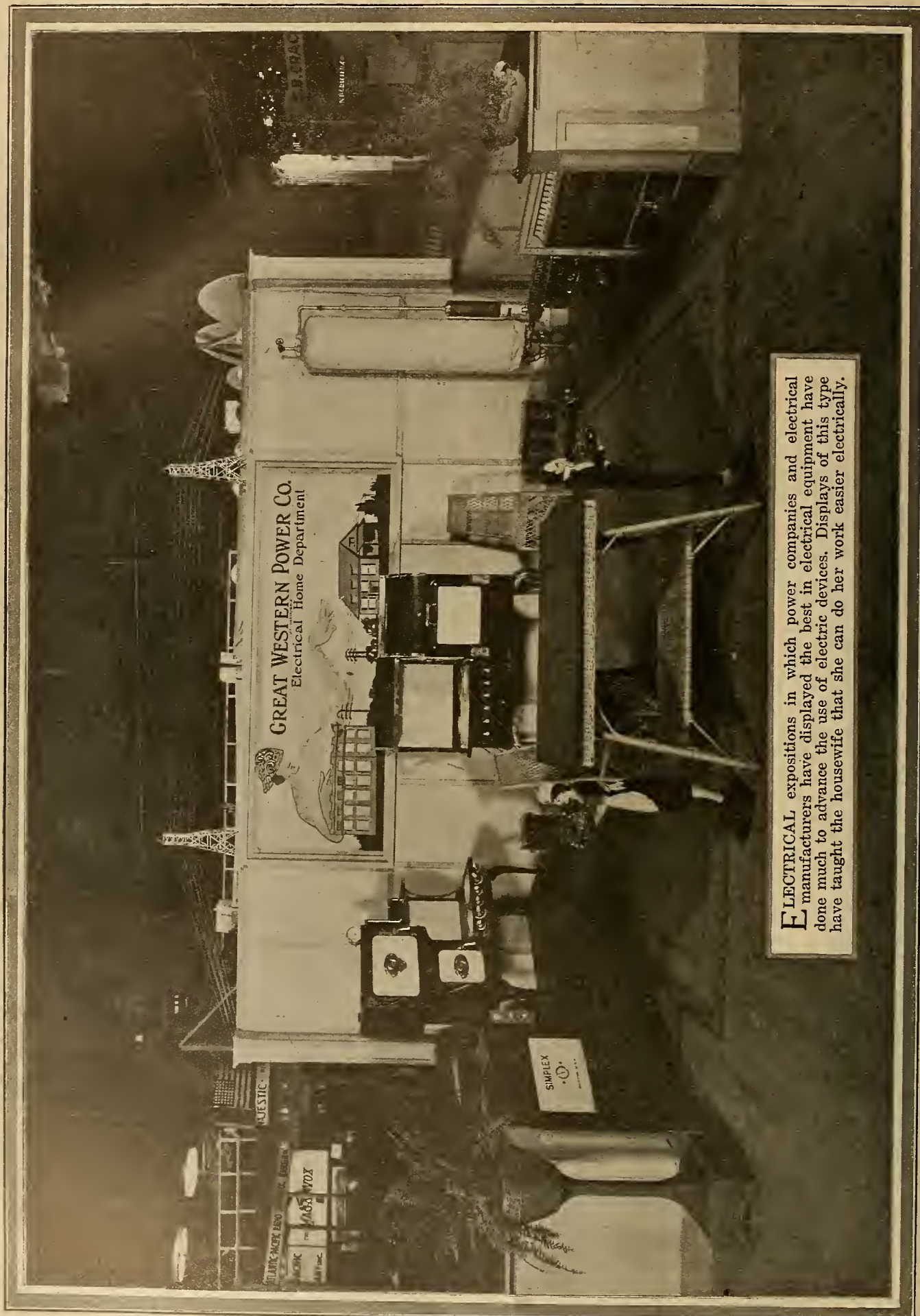
CREDIT discussion is not confined to the electrical industry alone. Dun, Bradstreet or Babson statistics sound an annual warning of the wrecks that lie in the path of business due to ill-judged granting of credit. In fact, over-extension of credits shares with ill-advised buying responsibility for the great majority of business failures.

The position of the credit man with any large organization is no sinecure, especially if the credit man realizes not only that he is responsible for the financial success of the enterprise, but also that a constant repetition of "no," will result in no business at all.

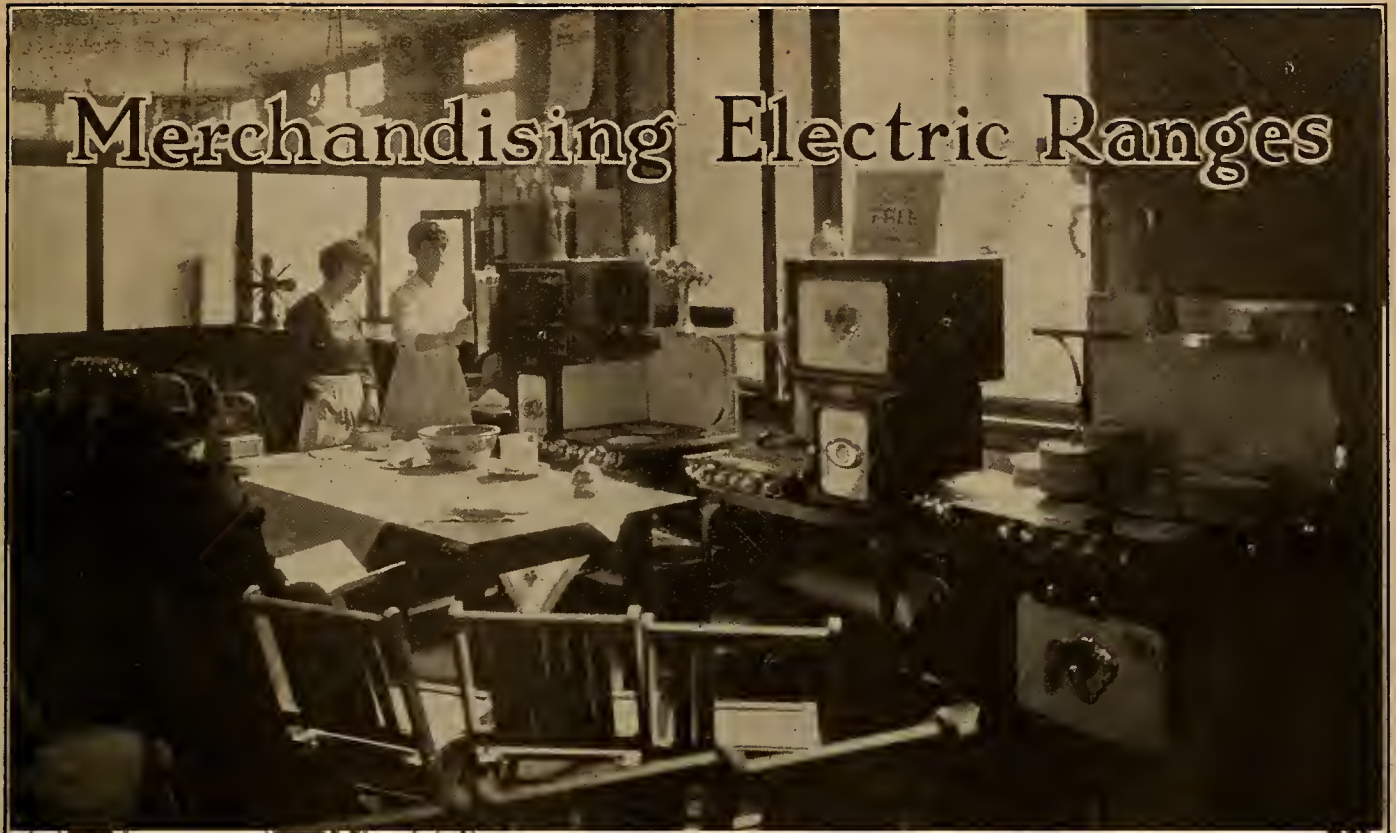
The greatest menace to the peace of mind of the credit man is the over-zealous salesman, the type that would give to the customer a deed to Golden Gate Park in consideration of an order for one-twelfth of a dozen assorted curling irons sold at six months net. The problem confronting the management is to strike a sane, intelligent balance between the enthusiasm of the salesman, and the negative reactions of the credit man.

Over-credits do the recipient a positive injury, and hurt the industry as a whole. For this state of affairs competition between business rivals is largely responsible, but nevertheless, this has gone on for years, and, to an extent, will probably continue. It would seem that the best solution of the credit problem would be the determination of a definite set of criteria upon which the amount of credit should be based, and then subject all applications for credit to this measuring stick, and abide by the result consistently. There is, of course, a human element that figures in appraising a man as a credit risk, his moral character, his standing in the community, his reputation for meeting obligations, and his knowledge of his business, and frequently much credit is granted upon nothing more tangible than these considerations. On the other hand, it would seem that something more substantial than personal honesty and good intentions should be back of the credit customer. The relation between many of our larger jobbing houses and their retail outlets may even become more like those of a banker than a merchant, which requires a large floating reservoir of capital that acts as a lump of undigested food in the stomach of trade, out in that twilight zone between sale and collection.

We believe that there is an abundance of brain and initiative within the electrical industry that can develop a clear-cut, intelligent credit policy through the establishment of a set of criteria by which the amount of credit, if any, that any man is entitled to, may be determined. We would like to learn of the experience of any who have attempted to devise such a method.



ELECTRICAL expositions in which power companies and electrical manufacturers have displayed the best in electrical equipment have done much to advance the use of electric devices. Displays of this type have taught the housewife that she can do her work easier electrically.



Merchandising Electric Ranges

SO much has been written about the cooking and heating end of the electrical business that the committee handling the paper this year despaired of finding any feature of the subject that has not been brought out in a most convincing manner—especially is this true of last year's paper, which is a matter of record. It went into the question of rates, revenue, increased business and power company experiences in handling cooking and heating and became convinced of the desirability of this load from the central station standpoint.

It is well recognized that the central station at this time is one of the most important factors in the sale and promotion of electric ranges and what speaks volumes for its future on the Pacific Coast is the fact that in the past year several of the largest companies have redoubled their former efforts and were able to turn in a very gratifying record of sales. In addition to this, two of the largest power companies on the coast and several smaller ones have just entered the field and are going out actively after this business.

It is not the intention of this paper to repeat the history of cooking or follow it through its various stages of wood, fuel oil, coal, natural and artificial gas. We are addressing electrical folks and assume that as such we admit the "arrival" of electric cooking and heating and are preparing ourselves to help in the education of the public along this line.

A quarter of a million people visited electric homes in the West during the year of 1922. It is proposed to tell the electric home story to twice that number in 1923.

In a series of cooking schools conducted for the benefit of the general public in the Pacific Northwest during the latter part of 1922 the electric cooking message was brought directly to the attention of over ten thousand housewives and

By A. H. Nicoll and Herbert Cram

THE public can only be sold the idea of electric cookery when the electrical people can intelligently propound the idea, and no salesman or executive can speak intelligently on the idea until he possesses an electric range in his own home. Indifference such as this is standing in the way of greater range sales.

and the public will place full reliance in the sales arguments used to dispose of our goods. Many plans have been worked on the past year to promote the electric idea to the public. Perhaps nothing compares with the "electric home" and no other form of advertising compares in results with those accruing from the staging of exhibitions of this kind. One eastern journal made an effort to keep track of the number of electric homes built in 1922 and when they reached the 120 mark they could not move fast enough and frankly admit they lost the count.

Twelve electric homes have been built and exhibited in the West in the past year. One hundred and sixteen thousand people visited the seven homes located in Seattle, Oakland, Alhambra and Vancouver, B. C.

That the public is interested in electrical comforts and conveniences has been evidenced by increased purchases of domestic appliances in every city in which a home has been displayed.

Another plan to carry the cooking and heating message into the cross-road and mountain districts, as well as into the larger towns and cities was brought to a successful conclusion by one of our large central station companies during the past season, as is shown by the following information, based on their experiences during the year 1922:

indirectly to two hundred thousand homes. The task now consists of following up this large number of live prospects in that territory.

Shall we take "pot shots" or shall we do a little private practice on the home "range" and bring 'em down with straight shooting based on first-hand knowledge? Let us first sell the idea to ourselves. Then our own enthusiasm for promoting sales will increase without measure

"During this period we held a total of 58 demonstrations, for which 24,000 invitations were sent out. Attendance was approximately 8,000 or 83 per cent. The various ranges listed in our price book were used for actual demonstration, only one range being used each time.

"During our demonstration variable programs of interest were presented, including, among other things, a wireless concert, moving pictures and other minor forms of entertainment.

"A prize was given at each demonstration, consisting of a toaster or some other lamp socket appliance, and the range used was offered for sale, subject to immediate purchase, at a reduction of \$25 from the regular price. This special price offer on the range resulted in a high percentage of acceptances.

"Demonstrations consisted of a dissertation on electric cooking, actual cooking and serving of samples to those present. This general method of demonstration was found so satisfactory that it is our intention to repeat the procedure this year. Sales of ranges and water heaters increased noticeably after the work got well under way, and we feel justified in an expenditure this year as great as that of 1922.

"In addition to these demonstrations, 11 displays of model electrical kitchens were conducted at county fairs and a three weeks' active demonstration was carried on at the Industrial Exposition in San Francisco."

Another power company tried the plan of using factory demonstrators in their various company offices. These were cooking demonstrations and would generally last a week in the smaller cities and two weeks in the larger ones. After a reasonable period this was repeated with another make of range. The benefits were not only in the sale of ranges, but in the opportunity it gave their employees to see the equipment under actual working conditions.

1922 Shows New Development

In past years large installations of ranges in apartment houses were not uncommon, but only in the last year has the 100 per cent electric installation obtained a real hearing. Of all the possible purchasers of electric equipment, the landlord is perhaps the most difficult prospect to handle, and he is skeptical not only of his own expense in the matter, but also of the attitude of his tenants. He must be convinced that they will regard electric ranges and electric heaters as an advantage and not as a drawback before he will be willing to place them in his house or apartments.

Among the many electrically equipped apartments now finished and under construction perhaps the most interesting is one now being built in San Francisco. This building consists of fifteen apartments and will be completely equipped for electric cooking, air and water heating. The heating system will be unique in that it will be the first large electric installation in which the heaters are controlled from a central point. Each room in the building will be provided with a flush type electric heater of sufficient capacity to take care of a difference in temperature of 30 deg. between the inside and outside of the building. Each heater will be provided with a three-wire circuit to the central point, and each heater will be built so that 100 per cent, 60 per cent or 25 per cent of capacity can be operated from the central point of control. This arrangement makes it possible for the janitor to control the maximum demand, and with the exception of extremely cold periods, it is estimated that 60 per cent of load will be the maximum capacity required. In addition to the central control, the heater will be controlled with an "on and off" three-pole switch, conveniently located near the heater. The owner proposes to provide the heat, but the wiring is so arranged that, at any time, any apartment may arrange for connecting its heaters to the range meter, in which case the owner will make allowance in the rent.

The water system will consist of a 450-gal. central tank with three 5,000-watt automatic electric heaters, providing continuous hot water service.

The current will be purchased by the owner through master meters and sub-metered to each tenant for lighting and cooking.

Another installation which is typical of the present tendency towards appreciating the advantages of electrical cooking and heating is a new San Francisco apartment house, consisting of 33 apartments, renting at \$60 to \$75—completely equipped—and depending entirely on electricity for cooking, heating and water heating. Each tenant has his own cook-

ing and heating meter and the owner provides continuous hot water service by means of a battery of 6-kw. automatic electric water heaters connected to a 1,000-gal. boiler.

Another apartment house depending entirely on electricity for cooking, heating and water heating allows each tenant the cost of 130 kw-hr. off his rent, the tenant paying any excess. In this case each tenant has his own water heater. Installations such as these will be watched with a great deal of interest and will go a long way in convincing the future electrical landlords.

Another very interesting installation is the electric heating of a theater in the San Joaquin Valley. This is arranged in connection with a cooling system for use in summer, whereby the air is drawn through a spray of water and forced under the floor of the building, where it enters the theater proper, through the ventilators under the seats. There is then an escape for the air through the ceiling of the building. An electric heater has been constructed which, during the winter months, is attached to the same ventilating fan so that air, instead of being drawn through the spray of water for cooling, is drawn through the heater and then forced under the floor of the building, entering the house through the ventilators, thus reversing the effect of the cool air in summer. This heater is 95-kw. capacity, three-phase, 220 volts, and is arranged with regulating switches so that it can be operated at full, two-thirds or one-third heat, the load being pulled off of three phases simultaneously, so that it is always balanced. This heater has a capacity sufficient to overcome a temperature difference of 35 deg. between the inside and outside of the theatre, with a movement of 7,000 cu. ft. per min., thus changing the air in the theater three times per hour. No definite figures have yet been obtained as to operating cost, for the reason that it will be necessary to wait until next winter in order to secure minimum temperatures. The furnace is so constructed that it can be readily moved up and attached to the fan, or it can be disconnected and moved into another room for storage during the summer months.

Domestic Science Classes

The large number of beautiful new schools on the Pacific Coast offer a tremendous educational field for electric cooking. A small number of these schools are equipped with electric cooking apparatus, but the field as a whole is surprisingly undeveloped.

The domestic science class teaches the use of the latest and best apparatus, and for that reason should be equipped with electric ovens and ranges.

Large benefits would result from the daily publicity given electric cooking by the pupils, who will talk and "sell" the electric idea every day. The period of transition from school girl to housewife is shorter today than ever before, and this means that the habits developed in the domestic science classrooms will be the habits which will, in most instances, be practised in their own homes. There are thousands of young women enrolled in these classes. The city of Oakland alone, with its 22 elementary, 10 junior high and 6 high schools has an enrollment of 2,839. This is a fair-sized group of possible boosters and future buyers and it represents only one city.

Then there is the sale of the equipment.

The building program in California alone is tremendous. San Francisco, Oakland and Sacramento have voted for over 25 millions. There are 20 new high schools in course of construction or contemplated in California, outside of the large cities, all providing for cooking classes. How many of these will be electric? The first real organized effort to attract this business was when the California Electrical Cooperative Campaign determined that in Los Angeles, where an extensive school building program is under way, it would exert every effort toward the electrification of the domestic science de-



This picture of the show room of one of the branch offices of the Southern California Edison Company was taken several years ago. This company has been marketing electric ranges for some time and has found that it is a good means of advancing the number of ranges installed.

partments of these new schools. To do this, it was first necessary, of course, to thoroughly convince the Board of Education of the advisability of such a step by pointing out to them conclusively the practical advantages of electrical cooking and give assurances of a general utilization in the future.

This was accomplished through a dinner meeting to which the Los Angeles Board of Education and the entire staff of the domestic science department were invited as guests of the electrical industry. This dinner, which was attended by approximately 300, of whom over half were of the school department and the balance of the electrical industry, was cooked entirely by electricity. The dinner was followed by several short talks upon the advantages of electrical cooking and the important part which electricity will play in homes in the future, and a response by the school superintendent expressing appreciation of the valuable information received. The dinner was successful not only in that it created a most favorable impression upon over a hundred and fifty teachers, who have in hand the molding of the ideas of future housewives, but it secured in the newspapers an impressive quantity of valuable publicity.

But however much we have been benefited in the past from all this business, and however much we appreciate this valuable publicity, we must always bear in mind that if this electrical industry of ours is to grow, the electrical dealer will and must function in so far as he is able.

There are several fundamental reasons, however, which still preclude the dealer at large from doing the big job of selling ranges—the most important of which we think is the financial side. It takes considerable time and money to create and promote range business and at present, we repeat, the central station is the logical one to put this idea over, with the thought that eventually it will revert to the electrical dealer when the public generally has accepted the idea of electric cooking.

When will the public accept the idea of electric cooking?

This big question is, we believe, the heart of this paper. The public will only be sold this idea in direct proportion to the way we as electrical people can intelligently propound

the idea, and we can never expect to attain this ambition with the half-hearted hit-and-miss system we are employing now.

Every central station executive and salesman who has any connection with electric sales departments must have an electric range in his own home.

This is of vital importance and while this same thought has been brought to our attention many times, we have only accepted it as theory and as far as can be observed very little attention has been paid to it.

Our industry is made up of many men in executive capacities who should and could purchase and install an electric range (if they believe in it). But by their example of indifference they have sown this same seed to their subordinates with the result we have today, a big electrical industry with men in many various ways making their livelihood from the electric business, playing “possum” by not practising what they preach.

Most manufacturers of electric ranges have seen the seriousness of this and have offered to central station and dealers' employees their ranges below cost. But why should manufacturers or jobbers have to go this far and pay you money to buy a device which presumably you recognize as being the only way that you, as an electrical man, should cook?

Some central stations have claimed that prices of ranges are too high. If they are—and we're not saying they are—have you considered the why of it? If a manufacturer or a jobber gives you a range at a price below established markets, it increases his cost. If a manufacturer or a jobber has to not only sell the central station but every “Doubting Thomas” in the organization and then go out and sell the consumer too, doesn't it run up a selling expense above normal?

One prominent manufacturer has stated that electric ranges are underpriced about 10 per cent, meaning that a consumer is getting a piece of merchandise of a value higher by 10 per cent than she is paying for. Co-ordinated manufacturing, distributing and selling, and buying will, we be-

lieve, be the stepping-stones to a better understanding of comparative prices, but for the present we must deal with the subject as we have—i.e., sell the service the range gives, the quality of the cooking and not the iron and steel that makes the range. By comparison with washing machines at \$150 to \$175, phonographs from \$50 to \$500, sewing machines up to \$175, etc., our electric ranges compare most favorably, especially when it is recalled that cooking in the average home consumes more hours in a day than washing does in a week.

Many thousands of dollars are spent by central stations in developing, organizing and training an electric range sales department, many conferences are held periodically throughout the year—bringing salesmen in from their territory to some division headquarters for the purpose of imparting more information to the men concerning electric ranges. This, we believe, costs the central station many dollars per man and still the job is only about one-fourth done because the salesman goes back to his home filled with ideas as to the theory of electric cooking only to have his wife cook his dinner with some other fuel.

We are probably attacking the problem from the wrong end. Why should we ask a salesman to discard some cooking device, in which he has invested his money, to propound our idea of electric cooking, when many of the executives are not themselves using this equipment?

Can you imagine an automobile salesman calling on you to sell a car, either riding a bicycle or in a horse and buggy—a clothing salesman waiting on you dressed in overalls? Why, then, should central station executives send a man out to call on your wife and mine to sell her an electric range when he is using any one of many other kinds of fuel? It simply cannot be done consistently and never will be done until we recognize this point. The automobile salesman does not have to buy an auto to demonstrate to his customers. Car agencies and factories have a certain number of cars at the disposal of their sales people to help them sell the idea of the pleasure in auto riding.

As a remedy for this serious ailment, we recommend the plan of having the central station purchase a range for each of their soliciting salesmen and install it in his home, charging the salesman \$10 per month until the entire amount is paid to the central station, when the range would revert to the salesman. If the salesman should leave the employ of the company, the range would revert to the company to be used again for the next salesman. We believe this scheme will not, in the end, cost as much as frequent sales conferences, but will in a most decisive way educate our sales organizations in the use of this line of merchandise.

The plan if adopted by a central station should be agreed upon between salesman and employer when he enters your organization, so that right from the start he presents himself to your customers as a user of an electric range and consequently commands more serious attention from the prospect.

One central station man recently said, "We that use electric ranges in our homes should have a little button which would read, 'I use an Electric Range at home—Do You?'" We are afraid that our club would be small and venture to say that if a poll were taken of any conference, "electric range owners" would be in the minority.

Methods of Compensation for Salesmen

Practically every central station has different methods of compensation, some of which we list below:

1. Straight salary.
2. Salary and commission based on price of merchandise sold.
3. Salary and commission based on net increase of connected load.
4. Straight commission.

We believe that outside electrical salesmen, generally speaking, should be recompensed for their ability to sell more merchandise than another salesman in a comparable position, but with central stations we had a very different problem to face. The duty of any salesman for a central station is to sell satisfaction plus connected load. This satisfaction must be sold not only to consumers but dealers as well; hence our belief that a straight salary is the logical way to compensate except for the fact that extra compensation is always regarded and thought of in a much more appreciative way. Therefore, our belief is in a straight salary of an amount to attract good, clean, aggressive men, and then allow a very small commission based on increase of connected load less disconnects. This should be computed by districts and distributed to every employee in the district rather than to the salesmen only, thereby making sales people out of every one in the organization.

Straight commission work, or compensation based on sale of merchandise, has a very strong tendency to attract salesmen of exceptional ability for a short time only. This means much loss in educational expense due to labor turnover, also the possibilities of feeling between dealers and central station salesmen due entirely to natural selfishness on the part of salesmen to get the order and the commission. One other evil of this method is the possibility of the salesman splitting his commissions to land business, and many other special dealings which will not develop with salaried men.

In conclusion, our belief is that we must quickly recognize the necessity of equipping our sales organization electrically. If our solution is impractical, we should adopt a modification of it to suit local conditions, but by all means—we must adopt something.

Need For Better Illumination

By C. O. Martin*

TO fully appreciate the extent of the industrial lighting field we have only to note the results of recent surveys which show that approximately 60 per cent of the existing industrial plants of the country are in need of better lighting. In time of marked industrial activity this need becomes even greater because of the demand for increased production and the factory executive, where informed, is not only willing, but anxious, to spend money on illumination to help attain this greater and more efficient production.

Selling proper industrial illumination is a profitable business, not along to one class, but to all, and carries with it a created demand for a long list of electrical products and services. To the contractor-dealer it means greater profit on work and materials; to the central station, larger load and increased revenue; while, to the jobber and manufacturer, a stimulated sale of supplies and manufactured products. To the public at large, the effect of good industrial illumination is felt in the proportionate reduction in the cost of each unit of the finished product. This is brought about through the increased quantity and improved quality of that product as a result of the higher state of health, contentment, safety and skill of employees working under proper lighting conditions.

Like any other branch of the electrical industry, however, industrial illumination needs special study. It is not within the scope of this paper to go into the essential details for the design of adequate factory illumination, but to point out, in a general way, what constitutes adequate and satisfactory illumination as against the all too prevalent poor illumination, or just mere light, found in our factories. First

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of all, of course, there is the question of providing sufficient intensity on the working planes. Years of experience in factory lighting practice have established quite definitely the intensities best suited for the different classes of industry, as well as for the different operations within the industries themselves. These are expressed in foot-candles and are compiled in the form of tables available from any of the reflector and lamp manufacturers. Aside from sufficient intensity, there are other factors to be taken into account, chief among which are: elimination of glare, both direct and reflected, through the use of correctly designed reflectors, and the reduction of objectionable shadows through the careful choice and location of lighting units. Glare is fatiguing to the eye and may even produce permanent impairment of vision, while sharp, dark shadows not only slow up production, but also add greatly to the liability of accident.

Though there are three or more distinct types of reflectors used for industrial lighting, the most common and that accepted as the most satisfactory for all general purposes is the R. L. M. standard dome reflector. It is a porcelain enamelled steel reflector and is the result of the desire on the part of the reflector and lamp manufacturers, working jointly, to do away with the multiplicity of designs and to offer the industrial management a single standard for securing good illumination. The R. L. M. standard dome reflector, therefore, with a bowl enamelled Mazda C lamp, properly chosen as to size and correctly installed as to spacing and mounting height, will, in general, give all that might be desired for a first-class industrial lighting installation.

Quite naturally, the major consideration in the eyes of the factory or mill owner is the money value of good light in the larger return in both quantity and quality of work which may result from the installation of a superior, as compared

with an inferior, lighting system. Though a little difficult, perhaps, of interpretation into dollars and cents, we can safely say, and without contradiction, that good lighting is one of the least expensive of the tools commonly used in a shop, being much less even than heating and usually less than the cost of workmans' insurance. For instance, allowing each workman 100 sq. ft. of working space and counting in maintenance, lamp renewals, operating expense of the system, interest on the investment and depreciation, the cost of good lighting will not exceed 1.2 per cent of his wages, which, when contrasted with an increase in production of from 8 per cent to 20 per cent, a decrease of spoilage of approximately 25 per cent, and a decrease in accidents, with a corresponding decrease in insurance rates, leaves no doubt as to the big savings possible through a small cost for good lighting.

It has been found in interviewing factory executives that far more than half of them are entirely uninformed about lighting and its importance to a properly conducted plant. This applies not only to existing plants, but also to new ones being constructed every day. Upon whom, then, does the responsibility fall of enlightening these executives on their needs? Who are these men in the "first line of attack"? Primarily, they are the electrical contractors and the men in the commercial departments of the light and power companies. Then follow the dealer, the jobber and the manufacturer. The electrical contractor who, in the conduct of his business, comes in closer contact, perhaps, than anyone else with the man who foots the bill, has the real opportunity and, if measuring up to his responsibilities, will sell the idea of proper lighting and add just that much more profit for himself through more work and the use of increased quantities of materials, to say nothing of securing the good-will and satisfaction of his client.

Electric Signs and Billboard Illumination

By Paul D. Howse and Tracy W. Simpson*

THE commercial utility of the electric sign has become distinctly recognized, and it is now taking its place with store fixtures in the appropriation of business men starting new institutions. The desire has been created and the advertising value recognized, hence the electrical sign manufacturers, central stations and manufacturers of materials are receiving increased benefits. The electrical population of the West increased almost 100 per cent during 1921 and 1922 and the prospects are for a still greater increase in percentage during the coming year.

It has been conservatively estimated that more than one million electric sign outlets were placed on lighting company's lines in California during 1922. The majority of these outlets received 10-watt lamps. However, there were many instances where 25 and 50-watt mill type daylight lamps were used and averaging over 27,000 receptacles in actual signs it was found that the wattage per receptacle ran 15 2/7. The past year has noticed a great rush to use larger wattage lamps. This is satisfactory, and a good thing in the case of large letters, but it has been found that the reading value of the exposed lamp electric sign in sizes of letters less than 20 in. is not improved by increasing the wattage of the lamps above 10 watts, which was the old standard. Using 25 or 50-watt lamps merely makes a brilliant glare, but does not improve the long distance readability of the sign. In fact, it does sometimes the opposite, making such signs less readable at a distance. This is especially true with signs of porcelain enamelled steel background of high reflecting power.

For signs with letters above 20 in. in height which are of the exposed lamp variety 25-watt mill type Mazda lamps are entirely satisfactory and the proper thing to use. Above three-foot letters the 25-watt mill type lamp is the best. While on this subject of lamps it is to be noticed that the S14 10-watt sign lamps have proven most satisfactory, a considerable improvement in this type of lamp having been noticed during the past two years. The average life is well above one thousand hours. It will be recalled that when this lamp was first placed on the market its average life was hardly half of that figure. Furthermore, the use of the ring type filament in this bulb lamp has proven a boon. The filament is substantially fixed and has added probably 25 per cent to the life of the lamp. The improvement in the 10-watt sign lamp has resulted in doing away almost entirely with the 5-watt, 11-volt lamp and sign lighting transformers.

In the design of electric signs there is an increasing tendency to use interior lighted signs for the reading matter and to embellish the same with chaser borders of spectacular effects. On all letters under two feet in height the readability of the sign in the day time is improved if it is of the interior lighted variety, having the faces of the sign constructed of raised opal glass electric letters. There is an increasing demand for colors and pleasing effects brought about by colored lamps and color caps.

The greatest need of the electrical sign business on the Pacific Coast appears to be a widespread dissemination of simple and easy estimating figures so that everyone in the electrical business will be able to make a rough estimate of what an electric sign may be purchased for. Countless opportunities are lost on the part of electric lighting companies,

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electrical contractors and dealers, because they are unable to give a prospect a rough or approximate price on about what an electric sign will cost. The delay in referring this matter to a sign manufacturer is what causes the customer to grow cold and oftentimes the figures received from the manufacturer are so different from what the customer expected to pay that he becomes out of sympathy with the idea of purchasing an electric sign.

Interior lighted signs of the embossed opal glass letter variety will sell for about \$1 per letter per linear inch of height—that is to say, a 12-in. letter, \$12; a 6-in. letter, \$6. A double-face 12-in. "DRUGS" sign would therefore be about \$120. Signs estimated in this way will be probably over the actual cost rather than under it, and might include normal freight and erection on the face of the building. Lamp letter effects on signs will run from 70c per outlet to \$1.35 per outlet, depending upon the complication of the design. Motor operated flashers will cost from \$50 upwards, depending upon complications. Very satisfactory on-and-off thermostatic flashers in which the thermal circuit operates a relay solenoid which opens the main circuit, are obtainable at about half the price of motor-operated flashers. Roof signs are composed of skeleton letters costing about \$10 per foot of height—that is to say, \$40 for a 4-ft. letter of the V trough or block channel type. These are mounted on steel frame works which cost about 75c. to \$1.50 per sq. ft. of gross area of the frame work. The former figure is for low frames and the latter figure for high frames. Such prices will comprise ordinary erection on the building. Porcelain enamelled steel signs will sell for about 20 per cent above previously stated figures.

Considerable progress has been made during the past year in the use of gun cotton base celluloid enamel for painting electric signs. This has improved the wearing qualities of painted signs and gives these signs the same finish now generally used in refinishing automobiles. The use of pressed metal ornamentation, either in copper or zinc, is becoming quite general, so that signs produced by reliable manufacturers are works of art and an ornament to any building.

A depressing effect upon the electric sign industry has been the existence of the small underfinanced electric sign builder who is usually also in the business of making painted signs and cloth banners and who makes a few electric signs a year. Due to the fact that the average merchant purchases only one or two electric signs during his business lifetime he is not in position to discriminate between the large, well managed company and the curbstome operator. Such a condition will be materially remedied when the forthcoming Electrical Safety Code of the Industrial Accident Commission of the State of California has been effected. Such a code will provide for rigid standards in the construction of electric signs so that it will be necessary for the small manufacturer to install better machinery and testing equipment and to procure the underwriters' label on his sign. This will improve the standards of the business very materially.

An important point in connection with the design of electric signs and its application to advertising service is rarely understood and recognized. The average customer will come to the sign manufacturer with some trademark or script monogram which he has spent a greater deal of money capitalizing in connection with his printed advertising. He will want that monogram reproduced exactly in his electric sign and will not be satisfied with any other suggestion. Due to irradiation or the tendency of light to spread when viewed at a distance, such monograms or script lettering becomes practically worthless, but it is difficult to explain this to the customer. For the same reason there is a tendency on the part of inexperienced electric sign manufacturers to manufacture signs with letters altogether too close together or of too

narrow a stroke. A 6-ft. letter, properly spaced, can be read much farther than a 10-ft. letter improperly designed and improperly spaced.

To prevent irradiation effects the distance between each letter in a row of horizontal letters on electric signs should be at least one-half of the width of any single letter, and preferably one-half of the height of a single letter. By comparison of this with the arrangement of letters on a printed page it will be observed that the spacing of electric sign letters must be very much more liberal than the spacing of letters on a printed page of billboard. Purchasers of electric signs usually obtain competitive bids merely specifying height of letter and number of letters in the sign and do not realize that by doing so they are placing the high-grade manufacturers of electric signs at a disadvantage, as a sign properly designated might easily cost 50 per cent to 100 per cent more than a sign improperly designed. The principle is better enunciated by stating that it is impossible to produce an exact reproduction of a printed trademark in an electric sign and have that electric sign produce the same effect on the eye that a view of the printed trademark does. When the trademark is to be reproduced on an electric sign it is necessary to materially alter the same in order that it may produce the identical trademark effect on the human eye, as all irradiation effects must be neutralized.

With reference to billboard illumination, these boards represent one of the largest users of electricity in the advertising field next to the electric sign. The bulletin companies have found that their greatest percentage of clean cut profit has been on the illuminated bulletin, charges being from \$20 to \$50 per month extra for illumination. Wherever billboards and bulletins are found within possible reach of electricity about 90 per cent of them are now illuminated from dusk until midnight.

On 50-ft. bulletins with standard porcelain enamelled billboard reflectors carrying 100-watt lamps, ideal illumination has been found when the reflectors are placed about 6 ft. in front of the surface on 7-ft. 6 in. centers, the base of the reflectors being turned at about 45 degrees. A 50-ft. bulletin requires eight reflectors. Current consumption is therefore 800 watts or 4 kw.-hr. per night, operating five hours, making a daily cost of from 12c to 40c, according to the rate. It is found on the varnished bulletin surfaces that a glare exists to which some objection has been made. Hence wherever possible the bulletins are being flood lighted. However, this method of illumination is more costly and space is seldom available for the placing of flood lights. By placing flood lights on 18-ft. centers, 15 ft. in front of the bulletin, satisfactory illumination is obtained. This illumination materially reduces the glare. Five hundred watt units are found satisfactory.

There is no conflict between the electrically illuminated billboard and the electric sign. Each has its distinctive field. The illuminated billboard is distinctly a short reading proposition. Regardless of how large the letters may be on the background of an illuminated billboard they cannot be seen or recognized at more than one-fourth the distance of a similar height of letter when directly illuminated by either exposed sockets or interior lights on the electric sign plan. The reason for this is due to the glare and reflection from dark surfaces as well as light when such surfaces are illuminated by billboard reflectors or flood lights. This is the explanation of the failure to obtain satisfactory results from plain painted signs which are illuminated with billboard reflectors. The billboard, on the other hand, is in a class by itself in providing the greatest efficiency in producing an advertising message embodying a large number of words to be read at night from a short distance at a minimum cost.

Business Possibilities in Residence Lighting

By R. S. Prussia*

AN analysis of the electrical contracting end of the electrical industry develops the fact that residence lighting is the backbone of a contractor-dealers' business. Irrespective of business conditions or industrial activity, homes are always in use and new ones are constantly being built. The housing shortage is still a nation-wide problem, and it alone constitutes a field of vast proportions. One has but to open his eyes to the feverish building activities of the present day to realize why contractors and fixture dealers wear the smile that accompanies a busy season. There is the further field of the eight million homes that are already wired for electricity. Based on the survey by an authority pre-eminent in residence lighting concerning the "middle class" home it is safe to assume that the average home of today is less than "half-lighted."

From the 1920 census it was found that 54 per cent of our population live in rented homes, which leads to the assumption that approximately one-half of our people live in apartments or flats. Also, practically one-half of the country's population live in cities of 2,500 or over, hence it may be assumed that of the eight million homes already wired in the United States, the majority are city homes.

These figures are verified completely in an analysis by one of the foremost western central stations which inquired into the value of the residence lighting load. It was found that 47 per cent of the total revenue accrued from the sale of electrical energy was derived from the lighting load. Further, this residence lighting load represents 33.6 per cent of the total connected load.

It is obvious from the foregoing that there is a tremendous field alone from homes already wired, if these homes are to be taken out of the "half-lighted" class and given adequate and proper illumination. If the new homes building or to be built carry specifications for correct lighting it will increase very materially the comfort of those homes, to say nothing of the increased profits therefrom to fixture dealers and contractors.

How to Reach the Field

In the past the greatest drawback to progress in home lighting has been due to a concentration upon lamps and fixtures. Ask almost anyone to judge the lighting of a room and he will immediately turn his attention to the fixtures instead of viewing the room as a whole.

Fixtures should be selected on the same basis as plans are made for decorations. The decorator uses paint and wall paper to produce an effect or atmosphere in a room, and likewise a fixture dealer should recommend a fixture with proper lighting which will bring out the decorator's scheme and at the same time harmonize with the decorations. Too much attention in the past has been spent in trying to secure harmony of fixtures at the expense of proper lighting efficiency to bring out the decorative scheme, which tends to nullify the decorator's effort. We should direct the householders' attention to the expressiveness of light or to the effect of lighting upon the mood or expression of the room.

If we are to develop the residence lighting business it is important that we popularize lighting by making it proper and adequate, also by emphasizing the charm of lighting effects and by showing that lighting can be designed to meet the variety of requirements found in the home. Until recently the depths of the requirements and possibilities of resi-

dence lighting were not sounded, and as a consequence there was no uniformity of recommendations, which only added confusion to the indifference already possessed by the householder.

Important as is the lighting of a home in securing the ultimate of comfort and decorative effect, it seems inconsistent with good judgment when it becomes known that of homes built it is found that the allocation of expenditure for lighting averages approximately 1 per cent of the total building cost, whereas the decoration cost is from 5 to 7 per cent. To allow at least 2 per cent lighting would enhance the value of the decoration cost in a far greater proportion than the ratio of 2 to 1 would indicate.

It therefore behooves all those interested in the residence lighting field to acquaint themselves with the possibilities in residence lighting art of the present day and to disseminate this knowledge to architects, builders and, most important of all, to the householder whenever and wherever possible. By so doing, a tangible and material benefit to the contractor-dealer and fixture dealer's bank account is accomplished. It follows that the satisfied householder becomes a living advertiser for whatever concern accomplishes this satisfactory service for him.

Methods of Securing This Business

Experience has shown that actual demonstrations of lighting are extremely more effective than any method of mere description. Very few people realize the possibilities of lighting from a standpoint of ethics or of utility. It is as difficult to describe the possibilities of residence lighting to a person who has not seen them as it would be to describe to a Hottentot the beauty of Caruso's singing.

The best method for selling residence lighting effects is by the medium of demonstration booths or rooms wherein can be shown proper and improper methods, fixtures and lamps. Quite a number of prominent fixture dealers have increased their sales and add much to their reputation through this method because the householder is allowed to visualize the result of proper and improper lighting effect.

Then, again, the electric home is a most potent factor in selling the properly planned residence lighting idea, and the cost has been found to be ridiculously low for the result.

Special campaigns featuring one room at a time are very successful. For instance, a survey develops that 71 per cent of the kitchens are equipped with drop cord outlets. A campaign featuring an enclosing unit of good diffusing glassware creates a wonderful desire upon the housewife for better lighting in her home workshop. Only 9 per cent of our homes are equipped with the dome for lighting of dining rooms, which, by the way, is the correct idea for lighting of dining rooms, taken from any angle. This idea alone creates a tremendous field for the merchandiser. And so on for each other room of the home.

The residence customer, buying for personal use through the economic ups and downs of the country, is affected but little by such changes, and hence is a dependable source of revenue. The contractor-dealer and central station, also fixture dealer, can profit greatly by attacking this awaiting field, and by obtaining it, they will be doing a favor to the customer by making his home more convenient and cheerful and therefore a better place in which to live.

In closing, the writer wishes to place credit where credit is due for much of the foregoing data, and therefore offers his appreciation to Mr. M. Luckiesh, chairman of Residence Lighting Division of the National Electric Light Association.

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The Lighting of Retail Stores

By R. S. Prussia*

BETTER store lighting is the merchants' easiest step toward better sales. An engineer employed by one of Chicago's largest department stores recently remarked that when the store wished to dispose of a line of goods, they were moved to a section where lighting intensities were many times higher than generally prevailed throughout the store. Instinctively, they must have realized that the psychological effect of the increased intensity would have its result in moving the merchandise.

Successful retailing consists of three fundamental progressions:

- I. The attracting of passers-by to arouse curiosity and interest.
- II. The appealing demonstration of merchandise to arouse desire.
- III. The selling to purchasers to gain their enduring satisfaction.

Proper illumination will materially assist the merchant in accomplishing each of these results, and keen competition demands that it, like every other advantage, be used.

Light will not only improve the appearance of the store but can be made a pulling power in itself. Goods are displayed on the counter, in the show case, or in the window to be seen. Those that are not might as well be back on the shelf. The more of the merchandise a customer sees, the greater is the selection and variety offered to him, and the larger are the sales.

Customers whose confidence is sought by a merchant, should be allowed to examine merchandise before purchasing. By facilitating this inspection, proper lighting will assist materially and hasten the actual sale. Patrons who have to carry goods to the front door, or even home in order to see them, consume time, stock, and their patience.

Good lighting creates confidence and bespeaks quality. Successful merchants believe in good illumination—that is one prime reason why they are successful.

Out of one hundred and fifty store managers questioned regarding their illumination recently, 80 per cent stated that they were satisfied with same and the balance, or 20 per cent, were dissatisfied—at least one store out of every five is anxious for lighting service.

Another very recent survey made in many cities developed the fact that 57 per cent of the stores are poorly lighted. Such stores as cigar, shoe, millinery, ladies' clothing, piano, confectionery and furriers were found to be provided with slightly better than the recommended minimum of lighting. Other stores such as carpet, dry goods, hardware, music, drug, butcher, groceries, restaurants, bakeries, furniture and stationery all had just the minimum recommended intensity or much less.

For instance: 70 per cent of drug stores should have better lighting, the survey developing that percentage of stores investigated had less than 5-ft.-candle intensity.

Ninety-one per cent of grocery stores are lighting prospects. Less than 5 ft.-candles were found in 91 out of every 100 stores surveyed.

Sixty per cent of apparel stores have less than 9-ft.-candle intensity which would mean that 60 per cent of the apparel stores should have better lighting.

Instances of this kind could be cited to great length, however, only one further but very striking example will be

furnished. In 1921 the Commonwealth Edison Company investigated 1,000 stores selected at random. The average intensity for these stores was very low. Only 25 per cent had 5 ft.-candles or more. In 1922, a thorough campaign of sales effort on stores was made in which a standard of 10 ft.-candles was aimed at. This campaign added 45 per cent to the store lighting revenue of this central station.

Strange as it may seem, it is necessary to publish the fact that 26 per cent of store interiors are still lighted by Mazda B or Vacuum type lamps. To provide for the more efficient Mazda "C" type lamps, new illumination layout specifications should be secured by storekeepers which is another field of endeavor that should prove lucrative.

The fundamental basis on which a large number of business decisions are formed, is a comparison between a merchant's own practice and that of his competitors and others engaged in the same or similar lines of business.

It is an acknowledged fact that high intensities permit a proper and speedy examination of merchandise, thus speeding up the operation of selling. Employees are enabled to find goods quickly; an improvement in the esprit de corps and personal appearance of the employees is noticeable in those stores having a better class of illumination.

The responsibility for the lighting equipment is usually in the hands of the store engineer or electrician, whose initiative in advocating changes in lighting is tempered by the constant instructions of the management to keep down expenses. Unfortunately, the source of most of their information on the lighting subject is the fixture salesman. The fixture or specialty salesman constantly drills into his customers' ears the fact that his fixture has a greater efficiency than that of his competitor, with the result that there is a tendency to reduce sizes of units installed, rather than to increase them.

The average merchant thinks of lighting in terms of profit to his store. The Marshall-Field Company of Chicago recently said, "Good lighting increases sales in a store just as it increases production in a factory. Increases of illumination of 6 to 10 ft.-candles have increased the cost of lighting by 1 per cent and have been found to promote the sales by 6 to 7 per cent."

Better store illumination has been a subject of increasing interest during the past year with merchants who have been in a very receptive mood for ideas which would tend to better their lighting conditions. As a rule, the merchant of today is cognizant of the ability of good lighting to draw and hold trade. Any individual with sufficient lighting knowledge to talk intelligently and who has proper credentials, has but to ask permission to check up and study the lighting of a merchant's store to arouse the keenest of interest. So many surveys of lighting conditions, particularly in the merchandising field, have been conducted lately of which merchants are becoming more and more familiar that a merchant is very keen in having his store surveyed impartially, as he hopes after the survey is made to acquire the result of the findings for his personal benefit.

The proper use of foot-candle meter in checking sections of the store adds materially to the interest of the merchant and gains his confidence for the salesman. After a systematic check of existing lighting levels in the store has been made, when presented to the average merchant, together with recommended levels in modern practice as to lighting a store of his classification, it will generally be the means of opening of negotiations towards providing better illumination.

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By this means the merchant does not realize that the clever salesman, under the guise of surveying his store as one of many to be surveyed, is in reality surveying his store for purposes of demonstrating to the merchant that his own particular store is the one which needs changing.

Too often, the better class of store derives its lighting from some very ornate luminaire, which has been designed either by an architect or some manufacturer of lighting fixtures who had in mind primarily the building of some expensive fixture with little thought being given to the result from the standpoint of lighting, and this point should be brought out in the survey of any merchant's store if the condition as above outlined prevails, as it does in so many cases.

A manufacturer knows to a fraction of a cent what profit he makes on a commodity. He chooses certain lines as "leaders" because they sell rapidly or because of an especially good profit margin. From time to time he changes his "leaders"—switches his main selling effort from one article to another—because of the season or condition of the market. Why this generally accepted idea in all other lines of business is not more widely followed by contractor-dealers and central stations is a mystery. Just now store lighting is the obvious "leader" for sales endeavor by those concerns. It should be a leader, first, because it can be easily sold at the present time; second, because it is a big volume business, and, third, because it is an extremely profitable business.

Office Building and Flood Lighting

By Charles T. Phillips*

THE lighting of an office building offers a field for study, with possibilities of increasing the off-peak load for the central station. The office building load is not as desirable as a great many other classes of service, due to the fact that the load factor is low and the lighting peak is usually superimposed upon industrial and other afternoon loads, and this peak is of short duration.

There is no doubt of there being a fruitful field for improvement and this can, to a great extent, be accomplished by cooperation with the many manufacturers of electrical energy consuming devices used in offices, such as electric typewriters, fans, adding machines, dictaphones, mailing and stamping machines, addressing machines, etc. These devices are in constant use during business hours and, while the individual energy consumption is small, the combined load of a large number of these appliances may be well worth considering.

To supplement the daylight load of the office building there are numerous electrically-driven labor-saving devices that are used after working hours. These are portable vacuum machines, where the building is not piped for the stationary type, metal polishers and floor scrubbers.

The proper lighting of the office has not been given very much attention. There is usually some type of lighting fixture, but in the majority of instances these fixtures merely serve for general lighting and very indifferent lighting, as a rule.

In a large number of offices the daylight is not good, especially in the afternoon, and the public could be educated to the fact that good artificial lighting is superior to poor natural light.

An office well lighted with a high intensity of artificial light during the entire working day would certainly be an incentive for higher efficiency from clerical help than one that had only sufficient natural light during a few hours of the working day and dependence had to be placed on local lighting the balance of the time.

The advantages of good general lighting over local lights are many and the subject has been treated in various articles in the technical press, but unfortunately the office employer has not been educated to this fact.

It has become the task of the central station, the progressive lighting fixture manufacturer, the contractor and the consulting engineer to be the educator in this matter.

The central station has the most to gain in this phase of lighting as this class of service will assist in raising the load factor to a desirable degree.

The best time to attack the problem of more income and a high load factor from the office building is in the planning of the building. Each office should have the proper number of ceiling outlets of sufficient capacity for any type of lighting fixture that may be used, and, if possible, the type of lighting fixtures should be decided upon at the time electric wiring plans are being prepared. Recently, among some architects, it has been the practice to let the lighting fixture contract at the time the contracts for the building are let. Sometimes the lighting fixtures are included in the wiring specifications.

There should be a generous supply of convenience outlets. Small offices should have at least two, and, in larger office space, there should be one at least in every ten feet in the base board and at least two on every column. These outlets should have a capacity of 100 watts each.

Another source of income which has become very popular lately is flood lighting. This is a fruitful field, as the burning hours are long and the energy consumption is high.

Any structure finished in white or light tones can usually be flood lighted, if a suitable point or points can be obtained for locating the light projectors.

Practically every person is familiar with this class of lighting and it should not be a difficult task to convince the average owner of a store, office building or factory that the advertising value of this class of lighting will more than pay for the cost.

Churches and public buildings also lend themselves to this class of lighting; in fact, the field is unlimited.

Beautiful effects can be obtained by the use of color screens or lamps and various color combinations can be made and changed as desired.

The flood lighting load, if desirable, can be arranged to follow the afternoon or evening peak. The hours can be from between 5:30 and 8 o'clock, depending upon the season, until midnight, or even later, and, in some instances, all night.

The Value of Better Show Window Lighting

By Clark Baker*

HOW big a part show window lighting plays in the annual central station revenue is difficult to determine accurately. Some idea of it may be gathered, however, from the known lamp demand in the commercial field and from the generally accepted figures as to the amount of central station load and revenue represented by lighting as against power load. Also by dividing this commercial lighting into its various fields, such as store lighting, window lighting, sign lighting, etc.

In comparing show window lighting with other lighting fields, residential lighting demand has increased during the last two years at a rapid rate, due principally to an excessive housing shortage. Not only has the building rate been rapid, but very many old homes have been wired. Even

*Commercial and Residential Illumination Sub-committee of Commercial Committee: R. S. Prussia, chairman; L. J. Lasar, vice-chairman; C. O. Martin, Clark Baker, Chas. T. Phillips, Paul D. Howse, Tracy W. Simpson.

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with this boom, residential lighting still plays second fiddle to commercial lighting (of which show window lighting is a very important part) in total kilowatt-hour load and annual revenue.

The reason is easy to comprehend. The average store, we learn, has a connected load of 2 kw. and a load factor of five hours a day. The average home has a connected load of 762 watts and a load factor of 1½ hours per day. Assuming 40 per cent of the home load is in appliances, and that a rather small part of the connected load in the home is in use at any one time while the entire store and window lighting load is effective during the major part of five hours per day, it takes a lot of homes to equal one store when it comes to a consideration of central station revenue.

The industrial lighting field is excellent, but not so large at present as store and window lighting. With factories working at 60 and 70 per cent of capacity, and with comparatively few running night shifts, the lighting income from this source is smaller than it once was.

In order for the central station solicitor to cash in on home-lighting demand he must necessarily have to wait for an educational advertising program to become effective which takes time and is too broad a field for the lighting sales specialist to pay his way. But in the store window lighting field the central station lighting salesman will find things to his taste. Merchants everywhere for the past year have been in a most favorable frame of mind toward good illumination. It is almost impossible to find a merchant who will not readily admit the importance of illumination in drawing and holding trade. And competition is keen—a big factor in making the merchants eager to invest in anything within reason that will make his window outstanding and bring new buyers into his store.

Modern merchandising demands good illumination and good illumination must be efficient illumination. People will invariably pass up a store that is poorly or inadequately lighted, where, on the other hand, they will be attracted by a well-lighted show window. It follows the interior must be equally attractive. A recent survey indicates the following in store-window lighting: Good, 10 per cent; fair, 18 per cent, and poor, 72 per cent.

There may be discrepancies in these figures when applied to any particularly locality, but they do indicate that good window lighting is the exception rather than the rule.

It has just been learned what the actual drawing power of different levels of illumination is in show windows. This is the result of several tests which have been given much publicity, one in particular which shows that an increase in illumination from 15 to 40 foot-candles in a show window had an average attracting power of 24 per cent. Again, raising this illumination from a 40-foot-candle level to a 100-foot-candle level shows a further attracting power of 18 per cent. Therefore, 24 per cent plus 18 per cent equals 42 per cent increased drawing power, going from the lowest level of illumination in this test to the highest level of illumination, or, in other words, 42 per cent increased attracting power going from 15 ft.-candles to 100 ft.-candles.

It has been estimated and is assumed by some of the largest merchandisers that 40-foot-candle intensity in a show window with an attractive display is responsible for about \$100 per hour. Energy cost per one thousand hours at \$.05 per kw.-hr. for a 40-ft.-candle intensity window is about \$70.

Increasing this intensity from 40 to 100 ft.-candles increase the attracting power 18 per cent of \$18 an hour, and the energy cost per 1,000 hours at \$.05 per kw.-hr. has increased to \$175. This should make its appeal to the central station solicitor.

Another development in show-window lighting is the overcoming of daylight reflections. In order to accomplish

this it will be necessary to light certain objects to intensities of from 1,000 to 2,000 ft.-candles. It is obvious to a central station man what this would mean in load factor and revenue.

Polished plate glass under certain conditions forms a very excellent mirror. With a suitable background bright objects in front of the glass are reflected in minute detail, and many times does the magician stake his success upon the fact that the prominence of such images varies primarily with the relative brightness of the objects behind the glass and those which are reflected in it. Even with a comparatively light background reflections of objects having a still greater brightness can be seen very well. The most familiar instance of this effect is in the plate glass front of our show windows. When objects on or across the street are well illuminated the reflections are very evident in almost every window; when they are in bright sunlight and the background and trim of the window are dark, the relative strength of the reflections is such as to practically eliminate portions of the display. An effect of this character is so serious that the merchant will go to almost any length to eliminate it.

Show windows, particularly those located upon an important busy street, have a high advertising value, variously estimated by different proprietors at from \$50,000 to \$150,000 per year, \$1,000 per week, \$10 profit per hour, etc., depending upon the number, size and location of the windows. Without analyzing or comparing these estimates it is evident that a high value is placed upon show windows by the owners, and that whatever tends to reduce the attractiveness or visibility of the display is decidedly unwelcome.

In a number of cases an attempt has been made to do away with these troublesome reflections by the use of a curved plate glass. In general, this method is highly satisfactory as regards the elimination of reflections. It has not, however, been extensively employed, possibly because the use of curved glass requires that the lower edge of the glass be located from 18 inches to 2 feet behind what would ordinarily be the front line of the window. This not only gives a sense of distance to the observers, but furthermore the display being necessarily located further back receives less natural light.

It has long been realized that if it were possible to install in the window a sufficiently high intensity of artificial illumination, one which would provide a brightness of the objects in the window materially greater than the brightness of the reflected object, much of the veiling effect now encountered would be eliminated. Many have tried to accomplish this result by turning on the regular show window lights, but the results are usually disappointing. The reason for this, although frequently overlooked, becomes at once evident when one considers the relative brightness involved. Objects in bright sunlight are illuminated to perhaps 5,000 ft.-candles and their images on the plate glass appear to be at least one-tenth as bright as the building themselves; 50 ft.-candles or even 100 ft.-candles of artificial light inside the window can scarcely be expected to overcome brightness of 500 ft.-candles on the surface of the glass. Artificial illuminations of from 1,000 to 2,000 ft.-candles would be of more nearly the correct order of magnitude.

The average merchant thinks of light in terms of profit to his store. He can be most easily sold once he is convinced that better show window illumination has an actual dollars and cents pulling power, and will speed up sales, also stimulate the sale of slow-moving goods, and, likewise, give his store a better reputation.

Whatever other opportunities may present themselves in 1923, it seems hardly possible that any more profitable opening for increased central station income can arise than better show window lighting. It is something that any central station may cash in upon immediately by reason that the three Mazda manufacturers have an extensive advertising program in effect right now on store and window lighting.

An Analysis of Data on Cooking, Water and Air Heating

By J. W. Wrenn*

IN order to have the data presented in this report as complete as possible, no information was requested from the various member companies until after they had had an opportunity of closing their books for 1922 and making their annual reports. Unfortunately, many companies were unable to give all information asked for, but all furnished what was available. The results of questionnaires sent out on the subject are shown in Tables I, II and III. It was found at the end of 1922 that the companies reporting had 10,587 ranges, 7,269 water heaters and 120 bake ovens connected to their lines.

After a careful analysis of the data contained in the accompanying tables, the committee makes the following recommendations:

Ranges

The increase in the number of installations shown by the majority of the reporting companies indicates that the value of this load is appreciated by the companies and that the consumer is commencing to realize the many advantages of cooking electrically. The new rates recently put into effect in several districts in California will encourage this load. Under these rates the cost of operation compares very favorably with that of other and less desirable fuels.

An attempt was made to secure data in reference to the apartment house load. Unfortunately, the major companies did not have sufficient of this information available to be of statistical value.

The information reported shows that the average usage of apartment houses is considerably less than the ordinary home installation. Several installations averaged from 72 kw-hr. per month per range to 125 kw-hr. This business seems of considerable importance and greater attention should be given to it. It is frequently handled through one meter, the owner purchasing the sub-meters used for each apartment. Complaints are few and its educational value to the general public considerable.

In the central portion of the state where more attention has been given towards securing this load, it has been found that apartments equipped with electric ranges rent as readily as those where other types are installed.

*Sub-committee on Domestic and Commercial Data on Cooking, Water and Air Heating of Commercial Committee: J. W. Wrenn, chairman; R. C. Bragg, vice-chairman, O. Clifford, vice-chairman.

The load factors are very interesting and data along this line should be secured by all companies. That submitted, while interesting, was not enough to enable us to include same in this report. The maximum demand, compared with the connected load, is comparatively small.

It is estimated that there are now upwards of 100 apartment houses in this state fully equipped with electric ranges and considerable data should be available for the benefit of the industry.

The manufacturers report an increase in business for the year 1922 as compared with 1921, ranging from 40 to 60 per cent. This does not include those who came on this market during 1922.

Several manufacturers represented here are again establishing their agencies and all are looking forward to largely increased sales during 1923. Some of the older manufacturers estimate their prospective increase as high as 100 per cent.

At least one new range manufactured on the coast will be placed on the market this year and several local manufacturers are considering electric ranges for the near future.

Twenty schools are reported as having their domestic science rooms equipped electrically, six more partly so, and a number of others now building have specifications calling for complete equipment.

To encourage employees in the industry to use electric ranges in their homes, several manufacturers have made especially low prices on ranges sold to such employees.

Electric Water Heaters

The increase in the number of installations of this character seems to be quite satisfactory. Owing to unfavorable rates in various portions of the territory the increase is not as great as the convenience of the electric water heater would warrant. With more favorable rates and greater effort this would become a larger source of revenue.

Charts submitted show that the load operates largely on off-peak and continues on the automatic type until approximately three o'clock in the morning, and that the largest quantity of hot water is used between 9 and 10 p.m. and the next largest amount between 9 and 10 a.m.

A new water heater which the manufacturers have spent several years in developing is to be placed on the market in the near future. The manufacturers claim econ-

Table I—Domestic and Apartment House Installations, Ranges Only

| | Total Installed | | Increase % | Average Annual Usage and Income | | |
|---|-----------------|-------|---------------|---------------------------------|---------|------------|
| | 1922 | 1921 | | Kw-hr. | Total | Per kw-hr. |
| California Oregon Power Co..... | 389 | 322 | 21 | 1,692 | \$62.64 | .037 |
| Elk Lamolile Power Co..... | 21 | 9 | 133 | 538 | 22.37 | .0416 |
| Great Western Power Co..... | 1,472 | 1,000 | 47 | 1,320 | 46.20 | .035 |
| Los Angeles Gas & Electric Corp..... | 60 | 50 | 20 | 1,384 | 73.24 | .0529 |
| Pacific Gas & Electric Co..... | 2,665 | 1,865 | 43 | 1,800 | 63.00 | .035 |
| San Diego Consolidated Gas & Electric Co..... | 140 | 138 | ... | 2,131 | 63.84 | .03 |
| Southern Sierras Power Co..... | 530 | 420 | 26 | 1,800 | 85.85 | .0477 |
| San Joaquin Light & Power Co..... | 190 | 84 | 126 | 3,356 | 107.31 | .032 |
| Truckee River Power Co..... | 115 | 102 | 13 | 1,368 | 57.90 | .0433 |
| Vallejo Electric Light & Power Co..... | 89 | 83 | 7 | 1,754 | 57.40 | .0327 |
| Western States Gas & Electric Co..... | 147 | 110 | 33 | 2,680 | 74.50 | .0278 |

Ranges and Water Heaters Combined

| | | | | | | |
|---|-------|-------|-----|-------|----------|-------|
| California Oregon Power Co..... | 560 | 463 | 21 | 8,892 | \$101.88 | .0114 |
| Coast Counties Gas & Electric Co..... | 29 | 23 | 26 | 1,336 | 58.46 | .0438 |
| Coast Valleys Gas & Electric Co..... | 85 | 66 | 29 | ... | ... | ... |
| San Diego Consolidated Gas & Electric Co..... | 58 | 60 | ... | 3,631 | 107.00 | .0295 |
| Southern Sierras Power Co..... | 24 | ... | ... | 3,050 | 132.48 | .0434 |
| San Joaquin Light & Power Co..... | 116 | 44 | 164 | 5,799 | 144.19 | .0249 |
| Southern California Edison Co..... | 3,851 | 3,367 | 14 | 2,114 | 58.43 | .0276 |
| Western States Gas & Electric Co..... | 67 | 54 | 24 | 4,060 | 107.00 | .0263 |

Table II—Domestic Water Heaters Only

| | Total Installed | | Increase % | Average Annual Usage and Income | | |
|---|-----------------|------|---------------|---------------------------------|---------|-------------|
| | 1922 | 1921 | | Kw.-hr. | Total | Per kw.-hr. |
| California Oregon Power Co..... | 95 | 79 | 20 | 7,095 | \$39.24 | .0055 |
| Great Western Power Co..... | 770 | 440 | 75 | 5,280 | 49.20 | .0093 |
| Los Angeles Gas & Electric Corp..... | 5 | 4 | 25 | 1,978 | 85.14 | .043 |
| Pacific Gas & Electric Co..... | 1,300 | 900 | 44 | 4,500 | 90.00 | .02 |
| San Diego Consolidated Gas & Electric Co..... | 15 | 14 | 7 | 2,210 | 66.31 | .03 |
| Southern Sierras Power Co..... | 146 | ... | ... | 1,250 | 59.85 | .0479 |
| San Joaquin Light & Power Co..... | 31 | 13 | 138 | 2,393 | 80.96 | .0338 |
| Truckee River Power Co..... | 102 | 33 | 209 | ... | ... | ... |
| Vallejo Electric Light & Power Co..... | 8 | 3 | 166 | 4,440 | 132.20 | .03 |
| Western States Gas & Electric Co..... | 7 | 12 | ... | 3,750 | 93.00 | .0248 |

omy as to operation and first cost.

It is quite evident from the data sent in by members that the electric water heating load has been found to have very favorable load characteristics and to produce proportionately large revenue per kilowatt of connected load.

Water heaters installed in homes where ranges only have been used formerly increased the revenue from 150 to 300 per cent without necessitating any additional transformer capacity.

Apartment houses where electric water heaters are supplying continuous hot water service are earning lower average rates on the usual power schedules by reason of the load characteristics, and thereby reducing the cost per kw.-hr. to the consumer on his cooking and air heating.

It is quite evident that an electric water heating system, carefully designed and properly installed, not only offers a load with a unity power factor, but may be designed in respect to relationship between storage and heater capacity so that the load factor is extremely high and that relatively small transformer capacity is required. By time switching the load to keep it off the peak a very high load factor is possible without impairing the service to the consumer.

One power company uses the following schedule as a guide for determining proper boiler and heater capacity for apartment houses:

| No. of Apartments | Heater Capacity per Apartment | Boiler Capacity per Apartment | |
|------------------------|----------------------------------|----------------------------------|---------|
| | | Minimum | Maximum |
| 2 or 3 | 1,500 watts | 30 gal. | 40 gal. |
| 4 or 5 | 1,250 " | 30 " | 40 " |
| 6 to 11 inclusive..... | 1,000 " | 30 " | 40 " |
| 12 to 14 | 900 " | 25 " | 30 " |
| 15 to 19 | 800 " | 25 " | 30 " |
| 20 to 50 | 750 " | 25 " | 30 " |
| Over 50 | 700 " | 20 " | 30 " |

Boilers to be lagged with at least 2 in. of approved insulating material.

Several power companies are recommending in domestic water heating installations, the installation of a tank sectionalizer or limiting valve in connection with automatic electric water heaters. This valve serves to limit the amount of water which is kept continuously hot in the boiler, and it is claimed that it reduces the radiation losses about 50 per cent.

A very small automatic water heater which is integral with a small capacity insulated copper boiler holding two or four gallons of water and designed to operate from a lighting circuit, is being used extensively in offices and other places where a very limited quantity of extremely hot water is desired. This type of heater supplies continuous hot water service at a very small cost.

Bake Ovens

While reports indicate that several companies have been active in increasing their load in this line, it does not seem

to have received the attention it warrants. The load can be made largely an off-peak one, and the revenue derived compares very favorably with any industrial installation. Being a steady load during its period of operation, and operating continuously over long periods of time, it is far more desirable than a motor load. Further, an electric oven operated to the best advantage, is economical as to fuel costs, and the product is superior to that obtained with other types of fuel.

Unfortunately, but little data was obtainable, as the majority of installations reported were metered in connection with other loads—no segregation of the ovens having been made.

This business should receive greater attention, even to the extent of having a man especially detailed to assist dealers in placing them on the lines. Immediate results, however, should not be expected, but the results of a year's work by a good electrical oven man would be very satisfactory to the average company, this being a case not so much of the connected load as of the total usage per annum.

Commercial

These consist principally of installations in restaurants, cafes, etc., of so-called heavy duty equipment of ranges, broilers, cake griddles, waffle irons, toasters, rotisseries, etc., and are rapidly growing in favor as they become better known.

Installations reported on are as follows:

Old Faithful Grill, Fresno, Calif.:
Connected load, 42.3 kw.; average monthly use, 8,640 kw.-hr.

Hansard's Grill, Merced, Calif.:
Connected load, 61 kw.

Electric Grill, San Francisco:

| | Kw. |
|----------------------|-----|
| 1 Water Heater | 5 |
| 1 Griddle | 9 |
| 1 Waffle Baker | 6 |
| 1 Urn Heater | 3 |
| 1 Urn Heater | 2 |

Connected load..... 25

Union League Club, San Francisco:

| | |
|-----------------------------|-----|
| 3 22-kv. Hotel Ranges | 66 |
| 1 Broiler | 10 |
| 1 Bake Oven | 9.5 |
| 1 Toaster | 3 |
| 1 Griddle | 6 |
| 1 Egg Boiler | 3 |
| 1 Waffle Iron | 6 |

Connected load..... 103.5

Camille Mailhebau, San Francisco:

| | |
|-----------------------------|----|
| 2 22-kv. Hotel Ranges | 44 |
| 1 " Broiler | 10 |
| 1 " Salamander | 5 |
| 2 " Urn Heaters | 6 |
| 1 Water Heater | 5 |

Connected load..... 70

Table III—Bake Ovens

| | No. Installed | Annual Usage kw. | Average Annual Revenue | Per kw.-hr. |
|---|------------------|---------------------|---------------------------|-------------|
| Coast Counties Gas & Electric Co..... | 1 | 12,008 | \$404.45 | .0337 |
| Coast Valleys Gas & Electric Co..... | 1 | 33,495 | 957.97 | .0286 |
| California Oregon Power Co..... | 3 | 32,724 | 398.40 | .0122 |
| Great Western Power Co..... | 10 | 33,275 | 583.31 | .0175 |
| Los Angeles Gas & Electric Corp..... | 1 | ... | 187.85 | ... |
| Pacific Gas & Electric Co..... | 20 | 35,185 | 679.00 | .0193 |
| San Diego Consolidated Gas & Electric Co..... | 24 | 19,536 | 545.00 | .0279 |
| San Joaquin Light & Power Co..... | 9 | 33,727 | 568.58 | .0168 |
| Southern California Edison Co..... | 50 | 35,185 | 531.60 | .0162 |
| Truckee River Power Co..... | 1 | 48,000 | 1,234.80 | .0257 |

| | |
|---------------------------------------|------|
| Hotel Whitcomb, San Francisco: | |
| 1 Hotel Range | 22 |
| 1 Waffle Iron | 6 |
| 1 Broiler | 5 |
| 1 Griddle | 6 |
| 1 Toaster | 3 |
| Connected load | 42 |
| Lake Merced Golf Club, San Francisco: | |
| 1 Hotel Range | 22 |
| 1 Bake Oven | 5 |
| 1 Griddle | 6 |
| 1 Waffle Iron | 6 |
| 1 Steam Table | 6 |
| 1 Toaster | 3 |
| 5 Water Heaters | 25 |
| Connected load | 73 |
| Morrison's Grill, San Francisco: | |
| 2 Rotisseries | 64 |
| 1 Bake Oven | 11 |
| 1 Plate Warmer | 8 |
| Connected load | 83 |
| American Grill, Oakland: | |
| 1 Broiler | 10 |
| 1 Griddle | 9 |
| 1 Waffle Iron | 6 |
| 1 Toaster | 6.5 |
| 1 Bake Oven | 9 |
| 1 Bake Oven | 6 |
| 7 Urn Heaters | 11.5 |
| 1 Egg Boiler | 3 |
| Connected load | 61 |
| Montgomery Flynn, Oakland: | |
| 2 Waffle Irons | 12 |
| 1 Range | 7 |
| 1 Toaster | 6.5 |
| Connected load | 25.5 |
| Mead's, Oakland: | |
| 2 Waffle Irons | 12 |
| 1 Griddle | 6 |
| 1 Toaster | 6.5 |
| 1 Egg Boiler | 3 |
| Connected load | 27.5 |

These installations are of too recent a date to have data of value connected with their operation and are mentioned here only to show the growing tendency to install heavy duty electric equipment where sales are actively pushed.

The popularity of the electric waffle iron and electric toaster is growing rapidly. Installations are giving universal satisfaction and act as entering wedges for the sale of other heavy duty equipment.

Air Heating

Enormous strides have been made in electrical air heating. With the exception of radio, probably no other part of the electrical industry on the coast has shown such rapid growth during the past year. The manufacturers report increases in orders over 1921 in varying amounts of from 300 to 500 per cent, and state that the business already secured and now in sight warrants them in believing that the increase for 1923 will be even greater over 1922. One manufacturer reports enough business already secured to keep his factory running continuously for several months to come.

The great flexibility and convenience of electrical air heating is rapidly overcoming the former fear of its cost. Unfortunately, very little data extending over a long period of time is available, but installations made during the past winter have proved so satisfactory both as to cost of operation and heating results, that the owners of such installations are now busy recommending electrical heating to their friends.

Great care has been exercised to see that heaters of the proper size were installed and where it was a question of placing heaters that were too small the orders have been refused. This has resulted in giving complete satisfaction to users, and is a policy that should be adopted by all central stations. Enough wattage should be installed to properly heat the space required in the coldest weather. Thermometers should be installed and operators instructed to turn the heaters down whenever an excess temperature has been reached. With ordinary care in the operation of the electric heater, sat-

isfactory heating bills result. So far as we have been able to learn, not a single electric heater installation, properly installed, has been discontinued.

The Chamber of Commerce in Los Angeles is now considering using electric heat in their new building of approximately 600 rooms.

The plans of the El Bolivar apartment house at Long Beach of upward of 700 rooms call for electric heat.

The Abraham Lincoln School at Burbank has a connected heating load of 70 kw.

The Fourth Church of Christ Scientist in Oakland has a connected heating load of 40 kw.

The new school at Clarksburg will be electrically heated—connected heating load, 178 kw.

The Garden Grove School at Santa Ana has a connected heating load of 156 kw.

The new school at Esparto will be heated by electricity—connected heating load, 190 kw.

The school at Elsinore is heated by electricity—connected load, 90 kw. The trustees report complete satisfaction both as to cost of operation and results.

| | |
|--|----------|
| The Hotel Merced at Merced, Calif., is completely heated electrically. | |
| Number of rooms | 56 |
| Average monthly usage for 6 winter months..... | 8,506 |
| Average monthly cost for 6 winter months..... | \$131.34 |
| Average income per kw-hr. | .0154 |
| Average cost per room for heat..... | \$2.35 |

Heat for the lobby is included in above.

A theater in Modesto has installed a central electric heating plant—connected load, 96 kw. As yet no operating data is available on this installation.

Stockton has a new government training school electrically heated with a connected load of 349 kw. Maximum demand to date has been 240 kw.

The First Church of Christ Scientist in San Rafael is electrically heated—connected load, 37.5 kw.

Average usage per month for 6 mos. heating period 885 kw-hr.

Average cost per month for 6 mos. heating period \$32.63

Average income per kw-hr.0369

Trustees report complete satisfaction as to results.

The new bank of Napa will have a connected heating load of 103 kw. The Taylor Hotel Annex at Paso Robles has a connected heating

load of 83 kw.—maximum demand, 55 kw.

San Francisco has a great many all-electric homes.

Oakland has a great many all-electric homes.

San Jose has an electric home with a connected load of 42 kw.

Sacramento has an electric home with a connected load of 71 kw.

Santa Rosa has 14 electric homes built and in prospect.

A number of apartment houses in San Francisco and Oakland are completely equipped electrically.

An institution in San Francisco is about to install a 63-kw. heating load.

The estimated cost of electrically heating two large office buildings in San Francisco is interesting:

| | | |
|--|------------|-------------|
| Number of rooms | 216 | 544 |
| Estimated cost of air heating per year | \$6,094.56 | \$14,035.73 |
| Estimated cost of water heating per year | 434.70 | 1,796.70 |
| Estimated cost average per room per yr. | 30.23 | 28.91 |
| Estimated cost average per room per mo. | 2.52 | 2.41 |
| Estimated revenue per kw-hr..... | .0152 | .0153 |

A large electric heating installation recently made in San Francisco shows the following variable demand over the 24 hours:

Concrete building with concrete and tile floors.

Operated as show rooms—offices and factory.

Heating space approximately 400,000 cu. ft.

Inside temperature maintained at 70° F.

Connected load, 190 kw.

| February 16, 1923 | | Maximum Demand |
|--------------------------|--|------------------|
| Time | | |
| 6:30 to 6:40 a.m. | | 80 kw. |
| 6:40 to 7:50 | | 106 |
| 7:40 to 7:50 | | 110 |
| 7:50 to 8:30 | | 120 max. for day |
| 8:30 to 8:50 | | 108 |
| 8:50 to 9:50 | | 80 |
| 9:50 to 10:10 | | 72 |
| 10:10 to 12:40 p.m. | | 65 |
| 12:40 to 1:40 | | 52 |
| 1:40 to 3:20 | | 48 |
| 3:20 to 4:20 | | 40 |
| 4:20 to 4:40 | | 46 |
| 4:40 to 5:20 | | 42 |
| 5:20 to 6:00 | | 35 |
| 6:00 to 6:30 a.m. | | 30 |

The above was one of the cold days of the year. The following was on a warmer day:

| April 5, 1923 | | Maximum Demand |
|-------------------------|--|-----------------|
| Time | | |
| 6:30 to 7:40 a.m. | | 10 kw. |
| 7:40 to 7:50 | | 48 |
| 7:50 to 8:00 | | 60 |
| 8:00 to 8:20 | | 75 max. for day |
| 8:20 to 8:40 | | 60 |
| 8:40 to 9:00 | | 55 |
| 9:00 to 9:40 | | 50 |
| 9:40 to 12:40 p.m. | | 45 |
| 12:40 to 1:30 | | 32 |
| 1:30 to 2:40 | | 22 |
| 2:40 to 3:30 | | 18 |
| 3:30 to 4:10 | | 24 |
| 4:10 to 5:00 | | 28 |
| 5:00 to 5:30 | | 15 |
| 5:30 to 6:00 | | 10 |
| 6:00 to 6:30 a.m. | | 10 |

This building has large open area, is on the cold side of the street and has large glass windows. Is considered to be one of the most difficult heating jobs in the city. The management reports complete satisfaction. They are using the installation intelligently and turn the heaters down or off when full heat is not required.

The following data is on an apartment house recently completed in San Francisco, being 100 per cent electric:

33 apartments.

33 ranges—connected load, 177 kw.

4 water heaters—connected load, 24 kw. (1,000-gal. hot water storage tank.)

50 air heaters—connected load, 132.5 kw.

Lights, connected load, 20 kw.

Total connected load, 353.5 kw.

Elevators not considered, being on d.c.

Maximum Demands for 24 hours—March 24 to 25, 1923

| Time | Maximum Demand |
|---------------------|-------------------|
| 9:00 to 9:30 a.m. | 28.6 kw. |
| 9:30 to 10:00 | 33.2 |
| 10:00 to 10:30 | 27.5 |
| 10:30 to 11:00 | 23.0 |
| 11:00 to 11:30 | 22.6 |
| 11:30 to 12:30 p.m. | 22.0 |
| 12:30 to 1:00 | 22.0 |
| 1:00 to 1:30 | 26.4 |
| 1:30 to 2:00 | 23.0 |
| 2:00 to 3:00 | 19.8 |
| 3:00 to 4:00 | 17.6 |
| 4:00 to 4:30 | 19.0 |
| 4:30 to 5:00 | 25.5 |
| 5:00 to 5:30 | 22.0 |
| 5:30 to 6:00 | 24.2 |
| 6:00 to 6:30 | 32.0 |
| 6:30 to 7:00 | 37.4 |
| 7:00 to 7:30 | 33.0 |
| 7:30 to 8:00 | 29.5 |
| 8:00 to 8:30 | 30.3 |
| 8:30 to 9:00 | 35.0 |
| 9:00 to 9:30 | 38.5 max. for day |
| 9:30 to 10:00 | 31.0 |
| 10:00 to 10:30 | 24.8 |
| 10:30 to 11:00 | 22.5 |
| 11:00 to 11:30 | 22.0 |
| 11:30 to 12:00 | 21.0 |
| 12:00 to 1:00 a.m. | 17.0 |
| 1:00 to 2:00 | 18.7 |
| 2:00 to 3:00 | 17.5 |
| 3:00 to 7:00 | 16.5 |
| 7:00 to 8:00 | 21.0 |
| 8:00 to 9:00 | 22.0 |

During colder weather the maximum demand will be somewhat increased.

DATA ON A FEW ELECTRICALLY EQUIPPED HOMES

Mr. G. H. Anderson, 661 North First St., San Jose:

| | | |
|--|--------|---------|
| Air heating load..... | Kw. | 42 |
| Electric range load..... | | 8 |
| Bills and consumption: | Kw-hr. | |
| Oct., '22 | 570 | \$23.85 |
| Nov. | 1,250 | 30.48 |
| Dec. | 1,350 | 32.60 |
| Number of rooms, eight. | | |
| Equipment designed for forty (40) degree temperature difference. | | |

Mr. Bernard Ransom, Diablo, Calif.:

Twelve-room residence:

| | | |
|------------------------|--------|---------|
| Air heating load..... | Kw. | 39 |
| Water heater | | 5 |
| Electric range | | 8 |
| Bills and consumption: | Kw-hr. | |
| Aug., '22 | 1,246 | \$30.71 |
| Sept. | 2,743 | 63.60 |
| Oct. | 2,004 | 48.60 |
| Nov. | 3,630 | 78.81 |
| Dec. | 2,616 | 59.75 |

Geo. C. Stevens, Belvedere, Calif.:

| | | |
|------------------------|---------|--------------------|
| Air heating load..... | Kw. | 24 |
| Water heater | | 5 |
| Electric range | | 7 |
| Bills and consumption: | | |
| April, 1921..... | \$23.15 | Nov. \$11.00 |
| May | 14.83 | Dec. 29.59 |
| June | 17.59 | Jan., '22 .. 46.94 |
| July | 10.85 | Feb. 51.18 |
| Aug. | 11.64 | March 33.86 |
| Sept. | 9.82 | April 25.78 |
| Oct. | 9.31 | |

Doctor J. F. O'Brien, 2400 Broadway, San Francisco:

| | | |
|----------------------------|---------|----|
| Air heaters | Kw. | 22 |
| Electric range | | 8 |
| Water heater | | 3 |
| Average monthly bills..... | \$26.60 | |
| Maximum bills | 35.00 | |

Mr. H. J. Gute, San Luis and San Antonio Aves., Northbrae, Berkeley:

| | | |
|------------------------|--------|---------|
| Air heating load..... | Kw. | 23 |
| Water heater | | 6 |
| Electric range | | 8 |
| Bills and consumption: | | |
| | Kw-hr. | |
| Jan., 1921..... | 705 | \$19.32 |
| Feb. | 1,299 | 32.98 |
| Mar. | 1,116 | 28.77 |
| April | 775 | 20.02 |
| May | 810 | 20.79 |
| June | 820 | 20.25 |
| | | |
| | Kw-hr. | |
| July | 1,053 | 20.19 |
| Aug. | 1,916 | \$22.28 |
| Sept. | 1,085 | 25.76 |
| Oct. | | 20.37 |
| Nov. | | 21.67 |
| Dec. | | 33.54 |

The above homes depend entirely on electricity for heating, using same freely, and keep their homes warm and comfortable in the coldest weather. In estimating the heating bill due allowance should be made for the amount used for cooking and water heating.

Electricity is ideal for heating purposes in California. The coast towns require some heat practically all the year round and the interior in the cold months only. In the interior this load is replaced by the irrigation load in the summer months.

Industrial Electric Heating

By E. B. Criddle and F. O. Sievers*

IN making a survey of the possibilities of industrial heating on the Pacific Coast the subject must at first be studied in a general way. There are several viewpoints: First, the user's viewpoint; second, the central station viewpoint, and, third, the manufacturer's viewpoint.

The user of heat naturally first considers the old standard methods of heating using coal, coke, gas and steam for fuel, but is interested and will in most instances install electric heat if it can be demonstrated that electric heat will do cheaper work, do better work, do work that could not otherwise be done, and possesses sufficient collateral advantages.

Cheaper work may be produced by:

- Lower fuel cost.
- Higher fuel efficiency.
- High labor efficiency because of elimination of obnoxious gases, fumes and heat blasts.

- Change in process or more efficient handling of material by mechanical devices, this being only possible because of the nature of electric heat as a fuel. This item alone is very frequently the most important item to be considered. It usually develops that the energy costs are only a small part of the total cost of the product.
- Lower maintenance of oven or furnace.
- Ease of application.

Better work may be produced by:

- Accurate control of temperature.
- Elimination of contaminating gases and products of combustion and dirt.
- Better and more even distribution of heat.

Work not otherwise possible may be permitted by:

- Accurate control of temperature and other conditions, the source of heat being under positive control.
- Absence of fire or explosion risk.
- Greater quantities and more intense heat can be produced electrically in a given space than by any other known means.

Collateral advantages are often not evident or visible, but are there in almost every instance and frequently are of great importance and value. They may consist of:

*Commercial Committee: Don C. Ray, chairman; A. E. Holloway, vice-chairman; R. H. Airey, R. C. Bragg, Oscar Clifford, Herbert Gram, E. B. Criddle, A. M. Frost, L. J. Lasar, A. H. Nicoll, J. F. Pollard, R. S. Prussia, H. C. Rice, H. E. Sandoval, F. O. Sievers, J. W. Wrenn.

- (a) Lower fire risks.
- (b) Less floor space.
- (c) More healthful workrooms.
- (d) Less skilled labor.
- (e) Convenience in use, flexibility and portability.

Central Station Viewpoint

Electricity for industrial heating opens up a comparatively new and untouched field, the extent of same depending, of course, more or less, on the territory served. The load is a most desirable one, being greatly diversified, the load factor usually being very high, and the power factor also approaching 100 per cent. Where heat is used in factory production the equipment is usually used at least 8 hours and very often 24 hours per day. Some heat treating processes may be carried on at night, thus adding a considerable load without increasing the maximum demand.

The first step to be taken by the central station in developing this load is to secure the services of a competent commercial engineer to make a careful study or survey of the industrial in the territory. This work should be done by a man of considerable experience and ability, who is able to recognize an industrial heating prospect when he sees one. This will require a man of keen insight and vision and ability to study and analyze industrial plant operations and processes. It will be found that quite frequently processes or operations may be slightly modified, and in some instances may require radical changes to advantageously use electric heat. Because of his training, a technical man, preferably a graduate engineer, is better fitted to analyze and accurately study costs and operations.

The industrial heating load cannot be developed to any extent by merchandising methods. It should be handled by the sales engineering department.

The Manufacturer's Viewpoint

Cooperation with the manufacturer seems to be the most logical and satisfactory means to develop this field. The manufacturers of heating apparatus have specialists available and the central station will do well to take advantage of this and call on the specialist to work out any specific problem.

The smaller installations should be preferably handled by the central station engineer as the return to the power company continues as long as the device is in use, while the returns to the manufacturer consists of the immediate profit of the sale. It is obvious that for this reason the manufacturer should naturally expect cooperation by the central station to help the exploitation of these many small miscellaneous industrial appliances. Needless to say, the jobber and dealer is also expected to do their share.

The manufacturer of heating devices is ready at all times to cooperate with the machinery builder in the application of heating units to process machines, such as shoe, cigarette, box making and bread wrapping machines, which have one or more parts which must be heated. Steam and gas require extensive piping, considerable attention, and are in general not entirely satisfactory.

Field in California

Low temperature installations in this field will include:

- (a) Electric bake ovens, both shelf and revolving type.
- (b) Japanning and enamelling ovens.
- (c) General drying processes.
- (d) Core baking ovens.
- (e) Miscellaneous uses.

(a) Considerable data covering costs of operation and merits of installations of electric bread and cake baking ovens has already been published, so no attempt will be made here to cover this subject. The central station seems to be quite active in this field and there are many manufacturers actively soliciting this business.

(b) Outside of a few large installations, electric heating for enameling and japanning has not progressed here as much as it should have. One of the main reasons for the slow growth has been due to many attempts to electrify old gas or fuel heated ovens without properly insulat-

ing the oven. Quite frequently it will be found advisable to build the electric oven smaller than the old fuel heated oven, because the material can be baked in considerably less time in the electric oven. Smaller charges and more frequent bakes during the day lessen the maximum demand and consequently show more economical operation. Properly installed ovens are giving excellent results. Installations will now be found in not only the industrial centers, but in many of the smaller communities—for example, Stockton, Fresno, Modesto and Lodi. Nearly all of the large automobile companies have standardized on electrically heated japanning ovens for their main factories and assembly plants.

(c) For dry rooms in furniture and painting departments the electric heater cannot be excelled. Care must be used here to install a relatively low temperature heater. In a great many cases electric heat can very efficiently and conveniently be used to drive off moisture where the amount of same is not too great.

(d) There are hundreds of foundries scattered all along the coast, and when you consider that very few electric core baking ovens are in use, you must realize that here is a very fertile field for work. From the standpoint of efficiency and net cost, particularly for small cores in which breakage and loss from uneven baking usually is a very considerable item, the electric core baking oven is a success. The time of baking is considerably shortened and perfectly baked cores are the usual product.

(e) There are many miscellaneous "electrically heated" devices on the market, such as glue pots, soldering irons, space heaters, immersion heaters for water, oil and other liquids; branding irons, tire vulcanizers, sterilizers, water heaters, disk stoves, matrix dryers, metal melting pots and steam boilers, also butt welders, spot welders and rivet heaters. Many of these devices are being merchandised, but only in a small way. A little more effort on the part of dealers, contractors, central stations and manufacturers will make many of these devices universal. The electric rivet heater has been sadly neglected, but will come into its own as soon as the industrialists realize its advantages.

High temperature installations include the following:

(a) Air tempering ovens.—The electrically heated tempering oven costs less to operate than the oil tempering bath, produces equally uniform temper in the steel and eliminates subsequent cleaning. Ovens for this work are built for operation up to 750° F., which covers the full range required for drawing and bluing carbon steel.

(b) The small tool room furnace.—For heat treating tools or small parts, such as wrist pins, piston rings, etc., small resistors type furnaces are built to operate at temperatures up to 2,000° F. The temperature is uniform from front to back and can be maintained within $\pm 5^\circ$ automatically. Its use:

1. Makes possible exact methods in the shop, factory and laboratory.
2. Permits duplication of heating conditions as often as desired.
3. Eliminates labor and attendance to hold any given temperature.
4. Prevents spoilage through inattention on the part of the operator.
5. Uses less power, as current is applied only when needed.

All in all, it is a highly useful furnace in the tool room, shop, metallurgical laboratory, or the research division of any manufacturing plant. A 10-kw. furnace costs only 4 cents per hour to maintain at a temperature of 1,500° F. where the rate is 2 cents per kw.-hr. and only $6\frac{1}{2}$ cents additional to heat 50 lb. of steel.

(c) Heat treating furnaces.—Heat treating furnaces have been developed and are now in successful use in many manufacturing processes, requiring temperatures from 900° F. to 1,800° F. for hardening, drawing and annealing carbon steel, drawing high speed steel, annealing brass, copper and aluminum and baking vitreous enamels.

The advantages of electrically heated furnaces are:

1. Quality of product obtained from the electric furnace is decidedly higher.
2. Eliminates rejections due to non-conformity.
3. Atmosphere of furnace is practically neutral, thereby eliminating formation of scale.
4. Minimum labor for operating.
5. Even distribution of heat.
6. Absolute control of temperature.
7. Upkeep on an electric furnace is extremely low; only a fraction of the upkeep for a combustion furnace.
8. Loss due to breakage and warpage is reduced to a minimum.
9. Eliminates combustion gases and dirt.
10. Cost of subsequent machining operations, if required, is less, due to uniformity of heat treatment.

The Arc Furnace

Where quality and excellence are required, the electric steel melting furnace has practically supplanted the old methods. There are about 40 installations on the Pacific Coast, and most of these furnaces are operating and giving splendid results.

Due to the necessity of getting good coking coal from the East, making its cost here relatively high, and due to the abundance of the finest ores and unlimited deposit of lime rock, it will only be but a few years when the Pacific Coast will be a heavy producer of the high grade steels, the electric furnace contributing very largely to this output.

Here again considerable data have already been published, and therefore no attempt will be made here to show why the electric steel melting furnace has made such phenomenal strides as have been witnessed the last decade.

The brass melting furnace has taken a longer period to develop and the installations on the coast are relatively few. This furnace has been improved and new types are now

marketed. The high cost of fuel is easily overcome, for in comparing operating costs it is necessary to take into account not only fuel costs, but also labor, overhead, interest, depreciation, maintenance, repairs, supplies and metal losses. When all these items are properly considered there will generally be a favorable balance for the electric unit. The furnace must be wisely selected so that it will be operated to capacity a fair part of the time, showing again the necessity of thoroughly studying conditions. It is far better for the industry to grow slowly. Make sure each installation is a proper one. The manufacturer here can properly guide the central station and make the necessary recommendations.

Installations

Large Japanning Ovens

1. Durant Motors Co., Oakland:

1—3 compartment body oven built by Young Bros. Company, Detroit, Mich.

1—3 compartment body oven built by the C. M. S. Company, Tarrytown, N. Y.

1—Chassis oven built by Young Bros. Company.

1—Parts oven by Young Bros. Company.

The total connected load is approximately 2,100 kw., power consumption being in the vicinity of 10,000 kw.-hr. per day under ordinary production conditions.

The body ovens are divided into 3 compartments, each approximately 250 ft. long, holding about 20 bodies at one time, traveling along on the conveyor at a speed of about 30 in. per min., baking temperature being 250° F. To maintain uniform conditions the heating elements are divided into 6 sections and separately controlled.

The parts oven and also the chassis oven are both of the continuous conveyor type.

2. Chevrolet Motor Co., Oakland:

2—Enameling ovens, each having 200 kw. connected load, are used for enameling parts and fenders and hoods.

2—185-kw. ovens are now being installed, thus making a total connected heating load of 770 kw.

Vitreous Enamel Furnaces

Plant No. 1—Bath tub plant:

2—250-kw. "Duplex" furnaces.

3—150-kw. "Simplex" furnaces.

Total connected load, 950 kw.

The power consumption for the 150-kw. furnaces is approximately 100,000 kw.-hr. per furnace per month.

The power consumption for the 250-kw. furnaces is approximately 130,000 to 140,000 kw.-hr. per furnace per month.

Grand total, over 500,000 kw.-hr. per month.

The cost of electric heat compared to oil as fuel is, of course, higher, but due to the less number of rejections, greater production and better ware, the electric furnace produces a bath tub at a net lower cost.

Plant No. 2:

This plant is much smaller than the above, having only at present

2—150-kw. "Simplex" furnaces, power consumption being approximately 100,000 kw.-hr. per month per furnace, or a total of about 200,000 kw.-hr. per month.

Glass Annealing Lehr installed at Illinois Pac. Glass Co., San Francisco.

This Lehr is of the conveyor type, being 5 ft. wide and 50 ft. long. The molten glass, after being moulded into shape, is put in this Lehr and allowed to cool. If the cooling rate is not properly maintained, strains are set up in the glass, causing short life.

Here a very accurate temperature curve is maintained, there being several different heating sections or zones, 5 of them being automatically controlled by means of thermo couples. This Lehr has a connected load of 150 kw. consumption, being about 60,000 kw.-hr. per month. This unit was to some extent an experimental one and the results have been very gratifying to the user, with the result that a still larger one is now being built, using special air circulating construction patented by the customer.

A Study of Domestic Refrigeration

By H. C. Rice*

DUE to constant advances of science and more probably the increased application of electricity, great progress has been made in the artificial production of ice and refrigeration. Electricity has made refrigeration flexible. The electrically operated ice and cold storage plant of today is generally acknowledged to be not only the most suitable but the most economical from the standpoint of operation. However, the small domestic refrigerator has presented to the engineer a difficult problem and this "domestic refrigerator" called in counter distinction to the ice plant, has, through continual evolution, emerged finally as a successful and economical appliance.

Probably there has been no question put to the electrical dealer oftener than "Can I get a small ice machine for my own?" The field for such an appliance compares in magnitude with the telephone, light, heat and other utilities. As the substitution for ice in the home means a small, compact, automatically operated machine, electricity is the only means by which this may be accomplished, as no other motive power is feasible. The electric domestic refrigerator is in a class by itself because of its ability to accomplish for the household certain things impossible through the use of ice, namely: a much lower temperature in the ice box than can possibly be attained by ice. The melting of ice creates a humid atmosphere, through which the flavor of one food is imparted to another, with disagreeable results; the run-off from an ice box is foul, unsanitary and bothersome, while, on the contrary, electric refrigeration collects from the air within the box and concentrates upon the cooling coil all moisture, leaving the interior of the box absolutely dry, odorless and sanitary. The preservation of foodstuff is not due so much to cold temperature as it is to constant or unvarying temperature—for example, meat will quickly spoil with a variation

of ten degrees, and with the use of ice and its continual replacement, such a variation occurs in the ice box, while the electric refrigerator, through the use of a thermostatic control, maintains a practically even temperature, and thus a saving in food to the household. All of these advantages over ice should be capitalized in favor of electricity, because of the actual greater value.

The electric domestic refrigerator on account of its having to automatically coordinate many constantly changing conditions, such as possible interruption of current supply, interruption to water supply, changes in temperature from night to day, regulation of varying compressor pressures, etc., all in a fool-proof machine which must be depended upon to operate without personal attention, has confronted our engineers with a difficult task, which has gradually been mastered, and there are many of these electric domestic refrigerators on the market today which have gone through all experimental stages and may be relied upon as a safe and economical investment by the householder.

Space will not permit going into full detail here to describe the many electric domestic refrigerators on the market, particularly the different controlling devices, but, in general, the compressor system is the one proving successful. Many successful compressors have been developed, both of the displacement and the rotary types, much study having been given to design for best lubrication, least friction loss and longest life. Practically all of these are directly connected to small, high starting torque standard motors.

While the equipment actually varies in detail and construction, the process is one of compressing a refrigerant gas into a liquid, thus raising its temperature, which is lowered again either by extracting the heat through air radiation or water circulation; after which the expansion of this liquid refrigerant back into a gas absorbs the heat that was taken from it, and a consequent low temperature is produced, thus

*Domestic Refrigeration Sub-committee of Commercial Committee: H. C. Rice, chairman; J. E. Pollard, vice-chairman; H. C. Marcus.

drawing heat from the refrigerator box and its contents. The electric refrigerator is in reality a heating appliance, negatively speaking, as it serves the purpose of concentrating or drawing the heat to one point in the system and dispensing with it, thus creating an absence of heat in the system, particularly in the refrigerator chamber.

Many successful refrigerants are used, sulphur dioxide being to date the most adaptable for the small refrigerator.

The usual method is to expand the refrigerant through a coil in the cooling box, absorbing heat directly, although in some cases an intermediary or secondary absorption medium is employed by the use of a brine tank, which serves the purpose of attaining lower temperatures and also effecting heat absorption during intervals when compressors are not running. The electric domestic refrigerator can also make a small quantity of ice, if necessary, this being accomplished through inserting in the cooling chamber a pan of water wherein neat cubes of ice may be frozen.

While the first cost of the electric domestic refrigerator is comparatively high, it is well within the reach of the well-to-do house owner desiring such advantages as only the electric refrigerator can give. It is rapidly becoming popular and destined soon to be sold for a much lower price, due to the keen competition and development brought about by the many manufacturers who have undertaken to place such a machine on the market. Several dealers have established dependable repair service, which will have much to do in fixing the permanency of the electric domestic refrigerator's success by intelligently and promptly handling adjustments.

The high load factor of domestic electric refrigerators and the small size of the installation makes it a business which the power companies should encourage with a view to building up a profitable load which will noticeably aid in flattening out the system load curve.

It is the usual custom to compare the annual revenue produced by different domestic appliances, the one producing the largest revenue being considered the most desirable by the lighting company and the one most worthy of exploitation. The most desirable power customer is the one paying the largest amount per year per kilowatt of demand, and invariably more money and effort is spent to secure the power business having a high load factor. Perhaps, if we would analyze electric household appliances along these lines we could decide more intelligently which ones are the most desirable for the lighting company to exploit.

In the case of the electric range, the lighting company must, as a rule, spend more than \$100 for increasing the capacity of meter, service wires and transformer before service can be furnished, while the domestic electric refrigerator requires no additional investment of this character on the part of the company.

Annual Revenue for Kilowatt of Demand for Various Electric Appliances

\$0.084 is assumed to be the average lighting rate throughout the United States, and \$0.0325 the average cooking rate. The refrigerating machine, owing to its high load factor, is assumed to earn the same rate as the range.

It is apparent from the above data that the domestic

| Appliance. | Maximum demand in Watts | Annual kw.-hr. consumption |
|---------------------|-------------------------|----------------------------|
| Washer | 300 | 20 |
| Grill | 500 | 34 |
| Toaster | 500 | 37.5 |
| Range | 5,000 | 1,500 |
| Iron | 575 | 67 |
| Percolator | 400 | 42 |
| Cleaner | 170 | 25 |
| Radiator | 600 | 96 |
| Fan | 40 | 31 |
| Refrigeration | 300 | 864 |

Note: The annual kw.-hr. consumption of the appliance (except refrigeration) was obtained from data collected by the Society for Electrical Development.

refrigerating machine produces more revenue per kilowatt of demand than any domestic appliance served by a lighting company, and should, therefore, receive the favorable attention of the electrical industry and particularly the central stations.

Progress Toward Inductive Co-ordination

By J. E. Woodbridge*

SINCE the Public Utility Commission of the states of California and Nevada have established general orders regulating the construction and operation of power systems for the mitigation of inductive interference the utilities in those states are not as vitally interested in the preparation of such orders as are utilities in the eastern states, where such orders are now contemplated. The joint work of the National Technical Section with the American Telephone & Telegraph Company, in the preparation of a recommended code of rules, has therefore left the committee of this section in a more or less indifferent but advisory position. This committee has advised the National Committee that the codes of principles and practices as published in the reports of the Joint Committee are not sufficiently definite in that they give no quantitative limits whatever, all rules being limited only by such terms as "adequate," "suitable," "substantial," "due," "proper," "material," "close," "reasonable," "negligible," etc.

The National Committee has agreed to proceed with the formulation of quantitative limits or tolerances to these qualitative provisions.

Aside from this advisory work the interest of the section committee centers largely in the application and interpretation of general order No. 52 of the California State Railroad Commission. The effect of this order on power utilities appears to be misunderstood in other parts of the country—one impression for example having gained ground that no new parallels could be established in California. To counteract such misunderstandings the committee passed a resolution as follows:

"That all companies in this section report to the General Committee all new parallels or exposures one-half mile or over on lines of 60 kv. or more, and of one mile or over on lines of less than 60 kv., or shorter exposures if of particular interest, and also that they report all Railroad Commission rulings or interpretations relating to parallels on their systems."

General Order No. 2 contains no instructions on the division of cost of remedial measures between power and communication utilities. Since this is the most important unsettled principle of Inductive Co-ordination in the State of California, the committee's proceedings have largely been devoted to discussions of this division in the various classes of cases that arise. On account of the general interest in this phase of the subject the committee has requested the engineering department of the California State Railroad Commission to contribute to the proceedings of the coming convention a discussion of their views on this subject, which has been promised. The committee hopes that this will assist in clearing up the uncertainties and differences of opinion that arise in such cases.

*Inductive Co-ordination Committee: J. E. Woodbridge, chairman; W. L. Baden, L. J. Corbett, P. O. Crawford, C. A. Crawford, V. D. Elliott, G. Hager, R. H. Halpenny, L. M. Klauber, J. A. Koontz, L. J. Moore, T. W. Snell, R. Wilkins, R. J. C. Wood.

| Equivalent hours use of demand | Annual load factor in per cent of max. demand | Rate | Annual revenue | Annual Revenue per kw. of demand |
|--------------------------------|---|---------|----------------|----------------------------------|
| 66 | 0.75% | \$.084 | \$ 1.68 | \$ 5.60 |
| 68 | 0.78 | .084 | 2.85 | 5.70 |
| 75 | 0.85 | .084 | 3.15 | 6.30 |
| 300 | 3.4 | .0325 | 48.75 | 9.75 |
| 116 | 1.3 | .084 | 5.62 | 9.79 |
| 105 | 1.2 | .084 | 4.03 | 10.07 |
| 147 | 1.7 | .084 | 2.10 | 12.35 |
| 160 | 1.8 | .084 | 8.06 | 13.43 |
| 775 | 8.8 | .084 | 2.60 | 65.00 |
| 2,880 | 33. | .0325 | 28.08 | 93.60 |

Opportunities for the Central Station in Electric Vehicles

By A. M. Frost and H. E. Sandoval

IN 1921 the Electric Vehicle Bureau of the National Electric Light Association reported that more than 211,000,000 kw-hr. of electricity were required annually to charge the storage batteries used in electric vehicles in the United States. Of this amount 60,000,000 kw-hr. were used in electric street trucks, 25,000,000 in electric industrial trucks, and more than 126,000,000 kw-hr. were used in batteries for electric pleasure cars.

The electric vehicle field is too great to cover in one paper, and as the electric street truck affords the greatest possibility for expansion and immediate returns, this paper will be devoted entirely to this division, with the suggestion that next year's committee devote some time and attention to the electric industrial truck and pleasure car.

There are many reasons why the electrical industry and particularly the central stations should use, endorse and promote the electric motor truck, but the one reason which predominates and is of paramount importance by its very nature is the revenue which may be derived from the sale of current for charging purposes. In New York City and its environs the power sold for this class of business amounts to about 30,000,000 kw-hr. annually, with a revenue of about \$1,000,000, and an average rate of better than 3 cents per kw-hr. Chicago ran a close second, with almost the same revenue of a million dollars last year.

In 1922 there were 39,413 commercial trucks registered in the state of California. Estimating that the field for electric trucks is approximately 50 per cent of the total, gives a possible number of 20,000 electric trucks in this state. Using an average consumption of 250 kw-hr. per truck per week, this means a total of 240 million kw-hr. per year.

Calculating the value of this load at an average rate as low as 2 cents per kw-hr. the annual revenue to the central stations of the state will be 4.8 millions of dollars.

Interest in the electric truck for town deliveries is growing rapidly, some of the western fleets appearing in the list under Appendix C.

Many central stations spend much time, effort and money in increasing the number of lamp socket devices on their lines, and they are entirely justified in this as it is

good business. However, an electric street truck consumes from 4,000 to 12,000 kw-hr. per year, depending on its size and usage, and a medium-size truck in a year consumes as much energy as 750 vacuum cleaners; 650 washing machines; 200 percolators; 200 toasters; 150 irons or 200 60-watt lamps. Fig. 1 shows the use of these appliances.

Apply your own vehicle charging rate to the above consumption and figure your income per truck. And this is not all for the central station, for all the kw-hr. consumption comes during the night hours and tends to fill up that night valley which is such a "menace" to central station dividends. In fact, where central stations wish to supply charging service or offer special off-peak rates, this load can be practically limited to off-peak hours from 10 p.m. to 6 a.m. The effect of the sale of electricity for battery charging purposes on the central station load curve is clearly shown in Fig. II, which was compiled from actual record in substations in New York.

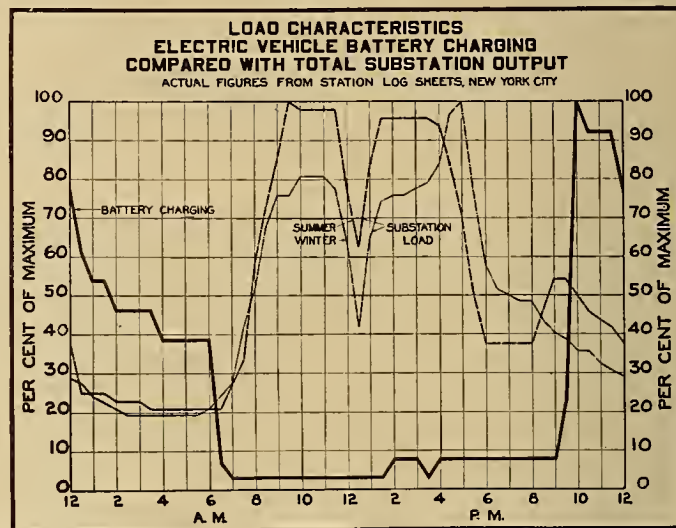


Fig. 2.—The advantages of electric vehicle battery charging as a central station load.

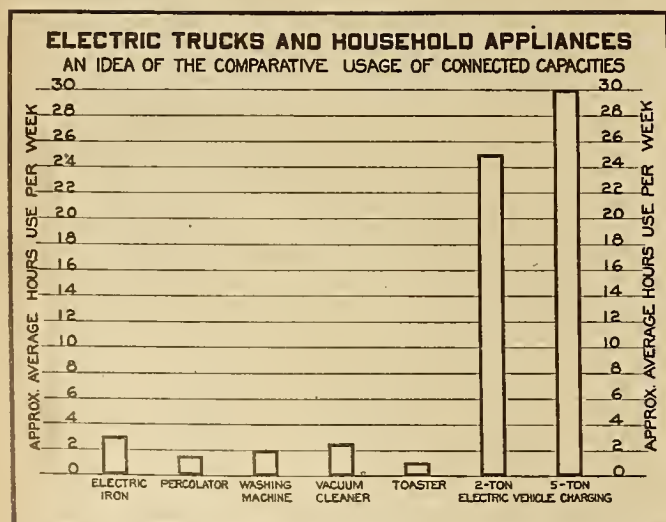


Fig. 1.—Advantages of electric vehicle charging as compared with popular household appliances. Prepared for the Electric Vehicle Bureau of the Commercial Section of the N. E. L. A.—1922.

It is a well recognized fact that the nearer the station's load curve comes to the horizontal the larger will be the earnings of the company involved, and battery charging is a step in that direction.

So much for the central station, but how about the consumer that must buy and operate these energy consuming trucks? As for him, the electric street truck, when used in the proper field, is more economical, more serviceable and more dependable than any other means of transportation, barring none, and this statement is based on facts and figures from actual usage.

And the question naturally follows—what is the proper field of the electric street truck? The electric truck is admirably adapted to the short haul, frequent stop field on heavy traffic city streets, where the total mileage per day does not exceed fifty miles. In this service electric trucking excels all other methods of transportation, and estimates by reputable truck concerns and central stations place from 70 to 85 per cent of all haulage in large cities in this class.

The big industries coming within this field of application are: (1) laundries, (2) bakeries, (3) ice cream manufac-

turers, (4) dairy companies, (5) bottlers, (6) coal and ice dealers, (7) storage warehouses and transfer companies, (8) public utilities, (9) department stores, (10) grocers.

The economy of the electric truck as compared with the horse and gasoline car is due mainly to its slow depreciation and its sane speed; this latter feature not only insuring the slow depreciation, but also materially lowering the general maintenance and operating expense of the vehicle. Tires, for instance, wear out approximately as the square of the speed. Compared with horses in like service, electrics will save from 10 to 35 per cent or more, route for route, while the saving over gas operation has been known to reach 50 per cent or more. Fig. III shows 1,285 10-year-old, 132 15-year-old and 25 21-year-old trucks operating in the Metropolitan District in New York City.

FIG. III.

| Electric Trucks in Metropolitan District, January 1st, 1922. | | | |
|--|----|----------------------|----|
| 4003—In Service Years | 1 | 395—In Service Years | 12 |
| 2899—“ “ “ | 6 | 221—“ “ “ | 13 |
| 2448—“ “ “ | 7 | 156—“ “ “ | 14 |
| 2044—“ “ “ | 8 | 132—“ “ “ | 15 |
| 1680—“ “ “ | 9 | 106—“ “ “ | 16 |
| 1285—“ “ “ | 10 | 74—“ “ “ | 17 |
| 980—“ “ “ | 11 | 33—“ “ “ | 18 |
| | | 25—“ “ “ | 21 |

Figure the Depreciation

Electric truck depreciation (exclusive of batteries and tires) is figured at 10 per cent, although this would seem to be high. On the other hand, a light gas car wears itself out in two or three years, five years being a maximum average life. Horses seldom stand up in daily service for more than five years. Therefore, figuring depreciation on these at 20 per cent is giving them the best of it.

Fig. IV shows comparative costs for one month test between a 3-ton Electric 8½ years old and a 3½-ton Gas truck 6½ years old, made by Westcott Express Co., in New York City. In neither case are depreciation or drivers' wages included.

FIG. IV.—COMPARATIVE COSTS OF ELECTRIC AND GAS TRUCK.

| 3½ T Gasoline Truck, 6½ Years Old. | | | |
|---|----------------|--|--|
| Number of working days (9 hours each)..... | 28 days | | |
| Overtime, 43 hours..... | 4 “ —7 hrs. | | |
| Total number days' service..... | 32 days—7 hrs. | | |
| Number pieces baggage handled..... | 3296 | | |
| Garaging (estimated)..... | \$ 25.00 | | |
| Gasoline cost | 164.28 | | |
| Oil cost | 6.76 | | |
| Repairs outside garages..... | 10.00 | | |
| Material used | 5.91 | | |
| Labor | 13.43 | | |
| Time lost account of breakdowns on street, 5 hours 10 minutes — cost | 5.91 | | |
| Time lost in garage obtaining equipment, lights, etc., and starting motor, 4 hours 35 minutes—cost..... | 5.25 | | |
| Total cost | \$226.57 | | |
| 3 T Electric Truck, 8½ Years Old | | | |
| Number of working days (9 hours each)..... | 29 days | | |
| Amount of overtime—39 hours..... | 4 “ —3 hrs. | | |
| Total number days' service..... | 33 days—3 hrs. | | |
| Number of pieces baggage handled..... | 3294 | | |
| Charging and garaging truck (outside garage)..... | \$ 63.00 | | |
| Allowance for battery..... | 33.00 | | |
| Material used in repairs..... | 2.01 | | |
| Labor | 7.58 | | |
| Time lost for repairs, 40 minutes—cost..... | .75 | | |
| Time lost in garage obtaining equipment, etc., 1 hour 20 minutes — cost..... | 1.53 | | |
| Total cost | \$107.88 | | |

The wages would doubtless be the same, but the depreciation of the electric would be less if figured in. Figure V shows comparative costs of 17 gas cars and 24 electrics operated by a bakery in Rosedale, Kansas.

FIG. V.—COMPARATIVE COSTS OF OPERATION.

| | 17 Gas Cars | 24 Electric Cars |
|-----------------------|-------------|------------------|
| Gasoline and oil..... | \$ 6,142.50 | \$ 642.12 |
| Repairs | 7,321.44 | 2,418.80 |
| Tires | 4,107.24 | 963.08 |
| Labor garage | 4,046.20 | 3,660.20 |
| Licenses | 248.20 | 213.37 |
| Depreciation | 6,600.00 | 4,800.00 |
| Current | | 2,461.50 |
| Insurance | 1,802.00 | 1,950.00 |
| | \$30,267.58 | \$17,009.07 |

Mr. Cowie, vice-president of the American Express Co., says the cost of operating electric struck versus gas trucks in his experience is in the ratio of 17 to 25, or gas truck costs are nearly 50 per cent greater. Reid, Murdock & Co. of Chicago says “10 electrics cost less for operating expenses than 4 gasoline trucks.” Appendix A shows actual comparative costs in detail of gasoline, electric and horse vehicles. Appendix B shows comparative costs of various size gas and electric trucks as prepared by the New York Edison Company.

Any electric truck manufacturer will supply any number of testimonials and data as to the economy of electric trucks from actual usage. Appendix C shows the use of trucks in this territory with testimonials.

Following are letters of testimony from truck users in this territory.

GENERAL ELECTRIC COMPANY

San Francisco Office, Rialto Building.

Mr. H. E. Sandoval, Assistant Manager,
Electric Sales Department,
Pacific Gas & Electric Company,
445 Sutter Street,
San Francisco, Calif.

Dear Sir:

In answer to your request that I secure for you information regarding our electric trucks, I am very pleased to attach a copy of a letter addressed by our Mr. H. L. Nagel, Manager of Warehouse, to Mr. E. O. Shreve, our Local Manager.

You may use such figures as you desire from Mr. Nagel's report, which you will notice, however, covers figures up to November, 1920. I might add for your own personal information that none of the figures include depreciation since the investment in these trucks was written off at the end of the fourth year.

If you desire further particulars in connection with this subject I know that Mr. Nagel would be very glad indeed to have you call him direct. I know, however, that these electric trucks have been a splendid investment for us, they are both satisfactory from the standpoint of operation and maintenance and are scarcely ever out of commission on account of necessity for overhauling or repairs.

Yours truly,

(Signed) ALLEN JONES,
Assistant Local Sales Manager.

OLD HOMESTEAD BAKERY

19th & Howard Sts.

San Francisco, Cal., March 29, 1923

Mr. H. E. Sandoval,
Electric Sales Department,
Pacific Gas & Electric Co.,
445 Sutter St., San Francisco, Calif.

Dear Sir:

Agreeable to your request for some comparative data relative to the difference in operating costs between team and electric truck delivery, the writer has looked up the cost of both types of delivery and finds that it costs about \$270 a year more to operate an electric truck, than it does to operate a team driven vehicle.

If consideration, however, is given to the additional carrying capacity of electric trucks, their greater speed which permits of serving an additional number of stops and yet completing their trip in from one-half to three-quarters of an hour less time, their greater power which permits of operation up and down steeper hills than a team can negotiate, their ease of operation, their cleanliness and their greater efficiency and dependability, there is actually very little difference in the delivery cost per unit.

From a sanitary standpoint, consideration should also be given to the elimination of the stable, especially around a food manufacturing plant; and from a financial standpoint, the release of tied up capital in land and building therefor.

In addition to these points of superiority, the intangible advertising value reflected in this type of vehicle should not be overlooked. The retail merchant who takes a pride in conducting an up-to-date business appreciates the favorable impression a smart appearing electric truck in front of his establishment creates among his customers, and reciprocates with his trade.

The writer has had ample opportunity to observe the operation of both types of delivery equipment, under varying conditions, and the fact that the institution he represents will be operating a 100% electric truck delivery within the next six months is evidence of his firm belief in their superiority.

Sincerely yours,

(Signed) H. A. BANSHAF.

NATIONAL ICE CREAM COMPANY

Guerrero & 15th Streets.

San Francisco, March 26, 1923.

Pacific Gas & Electric Co.,
445 Sutter Street,
San Francisco.

Attention: Mr. H. E. Sandoval, Electric Sales Department.
Gentlemen:

In response to your recent inquiry relative to electric trucks for San Francisco delivery purposes.

Will state that the Walker Electric trucks we have in our service have given complete satisfaction. Our experience with them began about a year ago and the cost of operation for that year shows considerable

Appendix "A"

Comparative Costs Statement Between Electric Motor Wagons and Gasoline Motor Wagons at Plants "A" and "B"

| | PLANT "A" | | PLANT "B" | |
|--------------------------------------|-----------------------|------------------|-----------------------|------------------|
| | Electric Motor Wagons | Gas Motor Wagons | Electric Motor Wagons | Gas Motor Wagons |
| Labor..... | \$21,776.51 | \$ 7,536.33 | \$20,710.32 | \$10,348.96 |
| Batteries and Supplies..... | 8,734.81 | 9,217.82 | 8,369.23 | 6,604.31 |
| Repairs..... | 14,428.08 | 16,370.54 | 19,884.62 | 9,395.57 |
| Insurance..... | 7,650.00 | 1,883.06 | 8,222.16 | 2,002.72 |
| Taxes..... | 272.53 | 129.76 | 322.53 | 181.84 |
| 6% Interest on Investment..... | 14,008.20 | 3,487.17 | 14,587.77 | 3,931.04 |
| Depreciation..... | 18,664.29 | 3,549.69 | 18,680.53 | 4,412.67 |
| (Buildings 1%) | | | | |
| (Automobiles 10%) | | | | |
| Power (Estimated)..... | 6,739.20 | ..... | 7,300.80 | ..... |
| (1½¢ per kw-hr.) | | | | |
| | \$92,273.62 | \$42,174.37 | \$98,077.96 | \$36,877.11 |
| Average No. Autos..... | 121 | 16 | 130 | 17 |
| Average No. Routes..... | 101 | 12 | 103 | 10 |
| Average No. Autos per Route..... | 1.198 | 1.333 | 1.262 | 1.700 |
| Average Cost per Route per Year..... | \$913.60 | \$3,514.53 | \$952.21 | \$3,607.71 |
| Investment—Land..... | \$16,736.44 | \$ 9,439.93 | \$17,207.54 | \$ 9,706.77 |
| Buildings..... | 34,017.17 | 14,948.13 | 37,287.17 | 21,022.15 |
| Automobiles..... | 182,716.47 | 33,731.46 | 188,632.75 | 34,788.38 |
| | \$233,470.08 | \$58,119.52 | \$243,129.46 | \$65,517.30 |
| Average Investment per Route..... | \$2,310.59 | \$4,843.29 | \$2,360.48 | \$6,551.75 |

NOTE: In view of the fact that the gasoline routes are twice as long as the electric routes, the true ratio in cost per route per year is 2 to 1 in favor of electric instead of 4 to 1, as would appear from the figures herewith. The period covered by the above report was over two years.

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saving over the cost of gasoline trucks of the same tonnage, capacity and mileage.

We are not in a position right now to quote actual figures but will work this up later on. We have ordered more of them and intend to use them as the need arises in the future.

The 3½-ton capacity trucks we are operating have 6 extra cells which we find adequate for the hills. The average route covered is about sixteen miles, round trip.

Yours very truly,

NATIONAL ICE CREAM CO.,
By (Signed) A. M. DODGE.

AMERICAN RAILWAY EXPRESS CO.
Western Departments,
635-637 Folsom St.,
San Francisco.

March 14, 1923.

Mr. H. E. Sandoval, Sales Engineer,
Electric Sales Department,
Pacific Gas & Electric Co.,
San Francisco, Calif.
Dear Sir:

Confirming our conversation of a few days ago relative to the adaptability of electric street equipment to commercial use in San Francisco:

I have pleasure in advising that in my opinion there is practically as broad a field here as elsewhere for the use of this class of truck. It must be admitted, of course, that its success depends upon a careful study of the specific needs to be covered, but this is true of gas, horse-drawn or any other kind of equipment. The electric truck, provided it is well constructed and placed in a field of operation within its mileage capacity, will and does operate in San Francisco as elsewhere with less upkeep and less general operation cost than do gasoline vehicles.

Trusting that this is the information desired, I am,

Very truly yours,

(Signed) F. R. MAULSBY,
Supt. M. V. Equipment.

THE CALIFORNIA BAKING COMPANY

San Francisco, March 26, 1923.

Pacific Gas & Electric Co.,
445 Sutter Street,
San Francisco.

Attention Mr. Sandoval.

Gentlemen:

We find that electric trucks used for delivery purposes are much cheaper than gasoline trucks.

Our comparative cost reports from a large number of bakeries throughout the country show that the electric cost, on the basis of a hundred pounds of bread, is forty cents while the gasoline trucks used by the same bakeries is seventy cents.

Our costs on both the gasoline and electric cars are less than the average owing to our large volume of business, but the proportions are the same, as our electric costs run between thirty-five and forty cents against sixty to sixty-five cents of the gasoline trucks.

Yours very truly,

THE CALIFORNIA BAKING CO.,
(Signed) R. J. WORKMAN.

PACIFIC STATES ELECTRIC COMPANY

San Francisco, Cal., March 16, 1923.

Pacific Gas & Electric Company,
445 Sutter St.,
San Francisco, California.

Attention: Mr. Sandoval, Electric Sales Department.

Gentlemen:

At your request of recent date, I am attaching a report showing the operation of our automobiles for the year 1922 and I hope the figures will be of some value to you in preparing your paper.

Our experience with electric trucks has been very satisfactory particularly from an economic standpoint. Electric trucks are particularly adapted to short heavy hauling and when used for that class of work the cost per mile ton is considerably less than through any other form of transportation.

Unfortunately, at the present time our trucks are not giving the type of service which is normally expected of an electric truck but that is due to the number of years they have been in operation and the result is that the speed of the trucks has greatly retarded.

Yours very truly,

(Signed) A. H. KAHN,
Purchasing Agent.

Appendix "A"—(Cont.)—Comparative Costs Statement Between Horses at Plants "C," "D," "E," "F," and "G"

| | Plant "C" | Plant "D" | Plant "E" | Plant "F" | Plant "G" |
|--------------------------------------|-------------|-------------|-------------|-------------|-------------|
| Horse Expense..... | \$ 2,668.38 | \$ 3,608.57 | \$ 4,106.60 | \$ 3,984.91 | \$ 6,912.88 |
| Wagon Expense..... | 2,172.07 | 3,861.56 | 5,473.40 | 501.26 | 7,287.27 |
| Harness Expense..... | 542.54 | 720.91 | 1,504.70 | 470.20 | 952.98 |
| Stable Labor..... | 4,168.63 | 8,443.94 | 5,916.26 | 5,892.42 | 9,783.05 |
| Feed..... | 8,462.45 | 13,127.41 | 15,605.33 | 13,577.72 | 17,137.78 |
| Stable Sundries..... | 1,049.79 | 1,873.81 | 1,889.78 | 1,176.13 | 2,444.29 |
| Depreciation..... | 919.98 | 1,462.38 | 1,396.90 | 1,557.97 | 1,405.22 |
| (10% on Wagon and Harness) | | | | | |
| (1% on Land and Buildings) | | | | | |
| Taxes..... | 717.96 | 868.99 | 1,512.98 | 1,613.26 | 711.00 |
| Insurance..... | 102.26 | 117.08 | 120.27 | 237.07 | 470.00 |
| 6% Interest on Investment..... | 2,772.71 | 3,926.24 | 3,661.71 | 5,768.02 | 1,692.15 |
| Total Expenses..... | \$23,576.77 | \$38,010.89 | \$41,188.93 | \$34,778.96 | \$48,796.62 |
| Average No. Wagons..... | 28 | 32 | 44 | 25 | 75 |
| Average No. Horses..... | 47 | 80 | 64 | 63 | 96 |
| Average No. Horse Wagon Routes..... | 20 | 32 | 32 | 26 | 46 |
| Average No. Horses per Route..... | 2.35 | 2.5 | 2. | 2.423 | 2.087 |
| Average Cost per Route per Year..... | \$1,178.83 | \$1,187.84 | \$1,387.15 | \$1,337.65 | \$1,060.80 |
| Average Investment per Route..... | 2,310.60 | 2,044.92 | 1,907.14 | 3,697.65 | 613.10 |
| Investment: | | | | | |
| Horses, Wagons and Harness..... | \$25,560.89 | \$24,014.31 | \$17,628.86 | \$21,157.99 | \$27,350.68 |
| Land and Buildings (Estimated)..... | 20,651.01 | 41,423.07 | 43,409.58 | 74,975.66 | 851.82 |
| Total Investment..... | \$46,211.90 | \$65,437.38 | \$61,038.44 | \$96,133.65 | \$28,202.50 |

The period covered by the above report was over two years.

Appendix "D"—Average Cost on Electric Trucks for Six Months' American Express Co.
Boston

| | Days in Service | Total Mileage | Elec- tricity | Battery Repairs | Tire Repairs and Renewals | Paint- ing | Body Repairs | Chassis Repairs | Garage Expenses | Total Expenses |
|-----------------------------|-----------------------|------------------|------------------|--------------------|---------------------------------|---------------|-----------------|--------------------|--------------------|-------------------|
| 1918: | | | | | | | | | | |
| July..... | 23 | 438 | \$9.70 | ..... | \$5.88 | \$0.74 | \$4.64 | \$33.67 | \$37.50 | \$92.13 |
| August..... | 23 | 429 | 10.43 | ..... | 7.16 | .57 | 4.72 | 43.64 | 36.06 | 102.58 |
| September..... | 23 | 725 | .49 | ..... | 1.79 | .56 | 4.93 | 30.00 | 35.30 | 73.07 |
| October..... | 23 | 441 | 22.56 | ..... | 10.21 | .77 | 6.35 | 25.45 | 34.36 | 99.70 |
| November..... | 23 | 449 | .37 | ..... | 7.33 | .58 | 4.46 | 28.47 | 36.38 | 77.50 |
| December..... | 23 | 460 | 13.48 | ..... | 11.64 | .67 | 5.79 | 37.17 | 42.01 | 110.76 |
| Average cost 6 months..... | 138 | 2,942 | \$57.03 | ..... | \$44.01 | \$3.89 | \$30.89 | \$198.40 | \$221.61 | \$555.83 |
| Average cost per month..... | 23 | 490 | \$9.50 | ..... | \$7.34 | \$0.65 | \$5.15 | \$33.07 | \$36.93 | \$92.64 |
| Cleveland | | | | | | | | | | |
| July..... | 23 | 487 | \$10.11 | \$11.02 | \$6.24 | ..... | \$0.96 | \$29.23 | \$11.46 | \$69.02 |
| August..... | 24 | 500 | 11.67 | 19.61 | 3.69 | ..... | .34 | 22.11 | 13.42 | 70.84 |
| September..... | 22 | 486 | 10.12 | 10.98 | 1.09 | .58 | .23 | 18.02 | 17.31 | 58.33 |
| October..... | 23 | 495 | 9.51 | 17.63 | 4.37 | 1.65 | 6.48 | 21.54 | 18.06 | 79.24 |
| November..... | 21 | 499 | 8.90 | 13.01 | 6.67 | 3.35 | 9.91 | 29.82 | 16.21 | 87.87 |
| December..... | 24 | 503 | 10.22 | 2.08 | 3.95 | 2.69 | 10.59 | 31.60 | 9.23 | 70.33 |
| Average cost 6 months..... | 137 | 2,970 | \$60.53 | \$74.33 | \$25.98 | \$8.27 | \$28.51 | \$152.32 | \$85.69 | \$435.63 |
| Average cost per month..... | 23 | 495 | \$10.09 | \$12.39 | \$4.33 | \$1.38 | \$4.75 | \$25.39 | \$14.28 | \$72.61 |
| Memphis | | | | | | | | | | |
| July..... | 25 | 633 | \$24.09 | \$4.24 | \$4.08 | ..... | \$1.84 | \$3.24 | \$18.76 | \$56.25 |
| August..... | 38 | 677 | 26.17 | 8.16 | 2.04 | ..... | 5.08 | 2.61 | 18.76 | 62.82 |
| September..... | 24 | 609 | 24.53 | 3.44 | 4.18 | \$3.13 | 3.25 | 2.10 | 18.76 | 59.39 |
| October..... | 25 | 631 | 26.09 | 6.32 | 14.80 | 2.50 | 8.98 | 10.32 | 18.76 | 87.77 |
| November..... | 22 | 550 | 21.40 | 19.60 | 9.94 | ..... | 9.08 | 2.68 | 17.50 | 80.20 |
| December..... | 22 | 543 | 20.93 | 5.32 | ..... | 2.22 | 11.82 | 2.31 | 16.81 | 59.41 |
| Average cost 6 months..... | 156 | 3,643 | \$143.21 | \$47.08 | \$35.04 | \$7.85 | \$40.05 | \$23.26 | \$109.35 | \$405.84 |
| Average cost per month..... | 26 | 607 | \$23.87 | \$7.85 | \$5.84 | \$1.31 | \$6.67 | \$3.88 | \$18.22 | \$67.64 |

Were it possible to recharge a battery with the same facility that it is possible to refill a gas tank, the only real handicap of the electric vehicle would be eliminated. For this reason the ultimate goal of battery manufacturers is to build a battery that may be charged or discharged very rapidly, and this is gradually being reached.

An electric vehicle salesman is apt to be called upon to compare his product with the corresponding gasoline vehicle, and when it comes to charging the battery he concedes that this is something a gas car operator does not have to contend with. On the other hand, the driver of a gas car has many duties which are not necessary with the electric, and even the process of supplying energy to the truck is markedly similar in the two cases except for the time involved. Properly designed charging equipment is not more complicated than the equivalent gas pump, nor does it require much more attention. The gasoline pump is equipped with a hose and nozzle, a measuring device and a valve to control the flow.

The quantity of gas required is ascertained from the gage on the tank. In the battery charging station, the charging plug and cable take the place of the hose and nozzle. The switch and rheostat control the flow of charging current and an amphere-hour-meter shows the quantity of electricity delivered. The quantity of electricity needed is shown by either the amphere-hour-meter on the vehicle or a hydrometer.

The vehicle salesman is unduly handicapped because the battery is generally accepted as a boxed-in mystery which requires a great deal of care and attention and the charging equipment as something that only an expert can fathom. But is this the case? The average gas car has a starting motor, battery and complete charging equipment which, though similar, is more complex than the corresponding equipment as applied to the electric truck. Yet it is safe to assert that much less attention is paid in the operation of a gas car to the battery, starting motor and charging generator and regulator than to the gas engine, transmission or clutch.

Data on Operating Costs of Gasoline Trucks

| Capacity..... | 1,000 Lbs. \$1,100.00 (Tires \$157) | 1-Ton \$2,200.00 (Tires \$118) | 2-Ton \$3,600.00 (Tires \$250) | 3½-Ton \$4,400.00 (Tires \$335) | 5-Ton \$5,500.00 (Tires \$413) |
|--|---|--------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|
| Investment—Chassis..... | 400.00 | 400.00 | 500.00 | 500.00 | 500.00 |
| Body..... | 400.00 | 400.00 | 500.00 | 500.00 | 500.00 |
| Total..... | \$1,500.00 | \$2,600.00 | \$4,100.00 | \$4,900.00 | \$6,000.00 |
| Fixed Charges: | | | | | |
| Depreciation @ 20%..... (Less Tires and Body) | \$188.60 | \$402.40 | \$670.00 | \$817.00 | \$1,017.60 |
| Interest @ 6% Half Investment..... | 45.00 | 78.00 | 123.00 | 147.00 | 180.00 |
| Insurance—Fire and Theft..... | 22.50 | 29.90 | 45.10 | 53.90 | 66.00 |
| Liability..... | 205.00 | 205.00 | 205.00 | 205.00 | 205.00 |
| Property Damage..... | \$2.00 | 82.00 | 82.00 | 82.00 | 82.00 |
| Total Fixed Charges..... | \$543.10 | \$797.30 | \$1,125.10 | \$1,304.90 | \$2,550.00 |
| Operating Charges: | | | | | |
| Garage (Housing, Washing, etc.)..... | \$216.00 | \$270.00 | \$300.00 | \$360.00 | \$420.00 |
| Gasoline @ 30c per gallon..... | 375.00 | 450.00 | 450.00 | 720.00 | 900.00 |
| Oil @ 70c per gallon..... | 52.50 | 52.50 | 47.60 | 56.00 | 84.00 |
| Grease and Waste, etc..... | 30.00 | 37.50 | 40.00 | 45.00 | 50.00 |
| Tires and Renewal..... | 300.00 | 450.00 | 480.00 | 600.00 | 742.00 |
| Repairs..... | 250.00 | 295.00 | 346.00 | 500.00 | 615.00 |
| Driver..... | 1,500.00 | 1,500.00 | 1,500.00 | 1,716.00 | 1,820.00 |
| Total Operating Charges..... | \$2,723.50 | \$3,055.00 | \$3,163.60 | \$3,997.00 | \$4,631.00 |
| Total Yearly Costs..... | \$3,266.60 | \$3,852.30 | \$4,288.70 | \$5,301.90 | \$7,181.60 |
| Cost per day..... | 10.88 | 12.84 | 14.29 | 17.67 | 23.93 |
| Apparent cost per mile..... | .21 | .25 | .35 | .44 | .59 |
| Speed Miles per Hour..... | 25 | 30 | 14 | 13 | 14 |
| Miles per gallon, gasoline..... | 12 | 10 | 8 | 5 | 4 |
| Miles per gallon, oil..... | 200 | 200 | 175 | 150 | 100 |
| Mileage per day (300-day basis)..... | 50 | 50 | 40 | 40 | 40 |
| Type of Vehicle..... | Vim | Vim | Packard | Hulbert | Pierce-Arrow |

Simplicity is one of the outstanding features of electric trucks. This should also be characteristic of charging equipment. Just as the manufacturers of batteries are striving to simplify the operations involved in caring for the battery, so the designers of charging equipment should simplify its construction and operation. The fundamental requirements for a charging station are: a direct-current source of supply, a switch and rheostat. Additional devices should be furnished sparingly and only when necessary for a special pur-

Appendix "C"—Number of Trucks Now in Use in California

| CLASS OF BUSINESS | LOS ANGELES | | SAN FRANCISCO | | FRESNO | | OTHERS | | TOTAL | |
|-------------------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|---------------|
| | Less than 2-Ton | 2-Ton or More | Less than 2-Ton | 2-Ton or More | Less than 2-Ton | 2-Ton or More | Less than 2-Ton | 2-Ton or More | Less than 2-Ton | 2-Ton or More |
| Bakeries— | | | | | | | | | | |
| Pacific | 28 | | | | | | | | 28 | |
| California | | | 40 | 2 | | | | | 40 | 2 |
| Old Homestead | | | 38 | 1 | | | | | 38 | 1 |
| Langendorf | | | 1 | | | | | | 1 | |
| Golden Sheaf | | | | | | | 7 | | 7 | |
| Breweries— | | | | | | | | | | |
| Eldorado | | | | | | | 3 | | 3 | |
| Buffalo | | | | | | | 1 | 2 | 1 | 2 |
| Coffee, Tea, Coca Cola: | | | | | | | | | | |
| C-C Co. | | 1 | | | | | | | | 1 |
| Hills | | | 1 | | | | | | 1 | |
| Creameries— | | | | | | | | | | |
| Burr | 36 | 15 | | | | | | | 36 | 15 |
| Crescent | | 8 | | | | | | | | 8 |
| Globe | | 8 | | | | | | | | 8 |
| Alfred | | 2 | | | | | | | | 2 |
| Gloria | | | 1 | | | | | | | 1 |
| Benham | | | | | 4 | | | | | 4 |
| National | | | 8 | | | | | | | 8 |
| L. A. | 102 | | | | | | | | 102 | |
| El Mirador | | | | | | | 2 | | | 2 |
| Jersey Farm | | | | | 3 | | | | 3 | |
| Capital | | | | | | | 2 | | | 2 |
| Department Stores— | | | | | | | | | | |
| Hamburger's | 4 | 2 | | | | | | | 4 | 2 |
| Broadway | 6 | | | | | | | | 6 | |
| Express— | | | | | | | | | | |
| American | | | 2 | 5 | | | | | 2 | 5 |
| Emmons | | | 1 | | | | | | 1 | |
| Grain and Milling— | | | | | | | | | | |
| Globe | | 4 | | | | | | | | 4 |
| Capital | | 2 | | | | | | | | 2 |
| Groceries— | | | | | | | | | | |
| Jevne | 4 | 2 | | | | | | | 4 | 2 |
| Craig | | 1 | | | | | | | | 1 |
| Ice— | | | | | | | | | | |
| Union | | 1 | | | | | | | | 1 |
| National | | | 2 | | | | | | | 2 |
| Peoplea | | | | | 2 | | | | | 2 |
| Ice Dist. | | 4 | | | | | | | | 4 |
| L. A. | | 1 | | | | | | | | 1 |
| Laundries— | | | | | | | | | | |
| White Star | 1 | | | | | | | | 1 | |
| California | 1 | | | | | | | | 1 | |
| Hollywood | 4 | | | | | | | | 4 | |
| Utilities— | | | | | | | | | | |
| Bu. P. & L. | | 12 | | | | | | | | 12 |
| City Pasadena | | | | | | | 2 | | | 2 |
| P. G. & E. | | | 1 | 3 | | | 1 | | | 4 |
| P. S. E. | | | 1 | 1 | | | | | | 2 |
| G. E. | | | 1 | 2 | | | | | | 3 |
| G. W. P. | | | 1 | 1 | | | | | | 2 |
| S. P. | | | | 2 | | | 1 | | | 3 |
| W. S. G. & E. | | | | | | | 2 | | | 2 |
| S. J. L. & P. | | | | | 3 | 2 | | | 3 | 2 |
| Times Mirror | | 1 | | | | | | | | 1 |
| Cea. Chemical Co. | | 1 | | | | | | | | 1 |
| Pac. Box Factory | | | | 2 | | | | | | 2 |
| Bishop & Co. | | 1 | | | | | | | | 1 |
| Bullock's | | 11 | | | | | | | | 11 |
| Thompson-Digge | | | | | | | 1 | | | 1 |
| Home Service Co. | | 5 | | | | | | | 5 | |
| James Smith | | | 1 | | | | | | | 1 |
| Total | | | | | | | | | 299 | 128 |

not be justified in comparison with the cost of gas driven trucks when the more intricate mechanism of the gas trucks is considered in the manufacturing cost.

The maximum of service and dependability from electric trucks comes from (1) its long life, (2) freedom from repair troubles, such as high cost of repairs, time lost, need of reserve equipment, large stock of parts, etc., (3) minimum of supervision, (4) minimum of driver attention, allowing driver to keep clean and solicit new business, (5) simple control, (6) all the speed the law allows in heavy traffic, the control of this speed being inherent in the truck, (7) short turning radius and overall length making it easy to handle in traffic and requiring small garage space, (8) almost instantaneous starting and stopping, (9) no idling when stopped, as with a gas truck, (10) available power for emergencies, (11) low inflammability and hence low insurance, (12) a simple rotating power unit which gives even acceleration and a minimum wear and tear on parts, (13) low tire costs.

Practically all electric truck manufacturers today have more business than ever before. The list of electric truck users includes most of the nationally known concerns which keep accurate account of their transportation costs, and the best testimonial as to the success of the electric truck is that today 70 per cent of the truck manufacturers' business comes from repeat orders. In 1922 the American Railway Express Co. added over 125 street trucks to its fleet, it now totaling 1,284. Appendix D shows the average operating costs of these trucks in Boston, Memphis and Cleveland for a six months' period.

Along with the knowledge of the potential fields and the advantages of the electric truck should go a knowledge of the claims of horse operators and gas car manufacturers. As to the horse, these are (1) lower investment, (2) lower operating cost, (3) a horse's ability to go over a route without supervision. Claim (1) is not true generally where investment in land, stable buildings, feed and other horse equipment is considered. Appendix A shows the average investment per route to be \$2,335.53 for electrics and \$2,114.64 for horses. Route for route, everything considered, the investment is much the same. Claim (2) is a fallacy for mile-for-mile it costs less to operate an electric than either a gas car or horse-drawn vehicle. Regarding Claim (3) tests show that a route can actually be covered in less time with an electric than with horses.

As to the claims of gas car exponents they are (1) higher speed, (2) unlimited mileage, (3) lower investment. Claim (1) is true, but that this, in itself, will save time on short haul, frequent-stop work does not necessarily follow. To what avail would a 30-mile an hour truck with a 100-mile radius be on an ice wagon route with a 10 or 15-mile haul over a period of ten hours, eight of which were spent standing in streets while ice deliveries are being made? Fig. 6 shows how a slow speed vehicle with a high rate of acceleration would, under conditions of frequent stopping, has about the same or even higher speed as a high-speed vehicle with a low rate of acceleration. In other words, on this work the electric has a high average speed. Actual tests on routes show an electric with a 10-mile speed finishes about the same time as a 25-mile per hour gas car under frequent stop conditions.

Claim (2) is true and electrics should not be recommended over 50 miles per day.

Claim (3) is only true with the cheaper or lower grade cars. The insurance rates for public liability and property damage insurance on electric motor trucks are now 25 per cent lower than corresponding rates for other types of vehicles and the fire insurance savings amount to from 50 to 65 per cent. On a two-ton electric truck these savings taken together amount to \$174, which is interest at 6 per cent on

pose. Simple equipment, with few but rugged protective devices, will usually give better all around satisfaction than a fully automatic board with a number of delicate instruments.

The high cost of the battery and the truck chassis has been frequently listed as a handicap to the general extension of the electric truck field. Especially the chassis and the motor seem to have an extremely high first cost, which can-

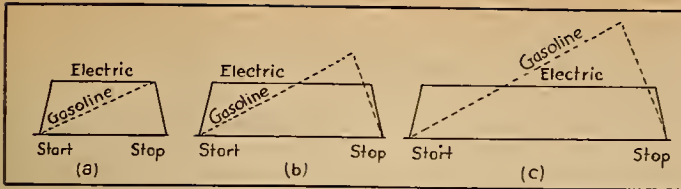


Fig. 6.—Graphical study of accelerations showing how a slow-speed vehicle with a high rate of acceleration would, under conditions of frequent stopping, have about the same or even higher average speed as a high speed vehicle with a low rate of acceleration. Horizontal distances represent time.

- Both attain the maximum speed of the electric truck. Relative average speeds:— gasoline truck 2.00; electric truck 3.56.
- The gasoline truck attains 50 per cent higher speed than the electric truck. Relative average speeds:— gasoline truck 3.00; electric truck 3.72.
- The gasoline truck attains twice the speed of the electric truck. Relative average speed:— gasoline truck 4.00; electric truck 3.80.

\$2900, or two-thirds the purchase price of the electric truck. Add to this the increased tire life, longer usefulness and low repair cost and were the owner to get his original gas car for nothing, still he could not afford to operate it in this particular field of service.

Everything being in favor of the electric truck for short haul service, why are not more used? The answer is (1) a lack of accurate knowledge on the part of the user as to delivery or haulage costs, (2) indifference on the part of the electric industry, especially the central station, as to the possibilities of the load. Actual analysis shows that the cost of delivery expressed in percentage of gross income is as follows: bakery 18 to 25 per cent, dairy 20 to 25 per cent, laundry 20 to 30 per cent, ice cream 20 to 25 per cent. A saving of 10 to 50 per cent on these costs means real profits.

Central stations, aside from the savings on operation costs of electric truck in their own trucking, receive a wonderful revenue from this off-peak load. And, indirectly, through the central station the whole electrical industry benefits. Central stations should and must analyze their transportation problems, and where adapted to the service, electric trucks should be used. To attempt electric transportation on long hauls is a bigger mistake at present than to fail to use them in their proper place. The electric truck is entitled to the unqualified support of the electrical industry, which must practice what it preaches. If this is not done, one of the biggest opportunities to obtain increased revenue immediately is slipping through its fingers.

In some localities the central stations may consider it advisable to install charging stations to insure proper service-

ing of the equipment. The question may even be raised as to whether or not the power company itself must establish these stations. The answer is apparent in the present service stations for starting and lighting batteries on gasoline cars. These stations were installed by the battery manufacturers when the demand became sufficient to warrant them. The central stations' greatest activity should be to sell the idea of electric trucks and to cooperate in every possible way with the truck manufacturer.

Therefore use electric trucks, advertise them and put a salesman out to talk and spread the advantages and economies of electric transportation. Establish a public battery charging station, if possible, although this is not necessary at present. Most of the truck manufacturers maintain men on this coast who will make delivery analysis and cost analysis of transportation problems, and they will recommend electric only where they are adapted to the service and will save money. Some manufacturers will not consider it a sale unless the electric does everything that was claimed for it. What could be fairer? They are doing their part, and now what are you of the electrical industry going to do help this business get started on your systems?

Observations on Operation of Power Transformers

By G. M. Wills*

UNDER the subject of treatment of transformer oil for removal of moisture and foreign substances it appears that one California company has been making use of a centrifugal oil separator with marked success. In the operation of the separator it has been found that the dielectric strength of oil can be raised from 9,000 volts to 22,000 volts with 0.1 in. gap by passing the oil through the separator once. It is also apparent that the centrifugal type separator is of particular value in the handling of very dirty oil. To quote from the report of this company, "Oil having so much dirt and water in it that it could not be profitably handled with a filter press (for the reason that it would require new blotters every three or four minutes) can be passed through the centrifugal separator at the rate of 150 to 200 gallons per hour. After about 2,000 gallons of such oil have been passed through the

*Power Transformer Sub-committee of Apparatus Committee: G. M. Wills, chairman; J. A. Koontz, R. C. Powell, R. A. Hopkins, W. C. Smith, H. Michener, J. S. Moulton.

Appendix "B"—New York Edison Company—Figures on Truck Operation Data on Operating of Storage Battery Trucks

| Capacity..... | 1,000 Lbs. | 1-Ton | 2-Ton | 3½-Ton | 5-Ton |
|--------------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Investment—Chassis..... | \$1,900.00 (Tires \$119) | \$2,300.00 (Tires \$164) | \$2,700.00 (Tires \$263) | \$3,900.00 (Tires \$328) | \$4,400.00 (Tires \$399) |
| Battery..... | 690.00 | 760.00 | 995.00 | 1,220.00 | 1,355.00 |
| Body..... | 400.00 | 400.00 | 500.00 | 500.00 | 500.00 |
| Total..... | \$2,990.00 | \$3,460.00 | \$4,195.00 | \$5,620.00 | \$6,255.00 |
| Fixed Charges: | | | | | |
| Depreciation @ 10%..... | \$178.00 | \$213.00 | \$233.70 | \$357.20 | \$400.10 |
| (Less Tires and Battery and Body) | | | | | |
| Interest 6% on Half Investment..... | 89.70 | 103.80 | 125.85 | 168.60 | 187.65 |
| Insurance—Fire..... | 23.00 | 27.68 | 33.56 | 44.96 | 50.04 |
| Public Liability..... | 205.00 | 205.00 | 205.00 | 205.00 | 205.00 |
| Property Damage..... | 82.00 | 82.00 | 82.00 | 82.00 | 82.00 |
| Total Fixed Charges..... | \$577.70 | \$631.48 | \$680.11 | \$857.76 | \$924.79 |
| Operating Charges: | | | | | |
| Garage (Charging @ 5.6c kw-hr.)..... | \$576.00 | \$636.00 | \$696.00 | \$780.00 | \$840.00 |
| (Housing, Washing, Oiling, etc.) | | | | | |
| Battery Renewals (3-year life)..... | 230.00 | 253.33 | 331.33 | 405.00 | 450.00 |
| Tire Renewals..... | 225.00 | 262.50 | 300.00 | 360.00 | 480.00 |
| Mechanical Repairs..... | 70.00 | 105.00 | 116.85 | 150.00 | 170.00 |
| Driver..... | 1,200.00 | 1,200.00 | 1,500.00 | 1,500.00 | 1,500.00 |
| Total Operating Charges..... | \$2,301.00 | \$2,456.83 | \$2,944.18 | \$3,195.00 | \$3,440.00 |
| Total Cost per Year..... | 2,878.70 | 3,088.31 | 3,624.29 | 4,052.76 | 4,364.79 |
| Per Day..... | 9.59 | 10.29 | 12.08 | 13.50 | 14.54 |
| Apparent Cost per Mile..... | .18 | .20 | .30 | .33 | .36 |
| Miles per Day (300-day basis)..... | 50 | 50 | 40 | 40 | 40 |
| Total Days..... | 300 | 300 | 300 | 300 | 300 |
| Speed Loaded..... | 10 | 9 | 8 | 7 | 6 |

centrifugal the bowl must be cleaned out. It requires approximately one hour to clean the bowl. We are saving oil—approximately 100 gallons per month—which was formerly thrown away because it was too dirty to filter."

As to the matter of angular displacement for three-phase transformers it does not appear to be of vital importance to the operating companies since reports show that some of them have no preference, although expressions have been received from some companies to the effect that zero displacement should be adopted as standard. The manufacturers are apparently willing to adopt whatever is decided upon by the operating companies as standard.

The value of tertiary windings in transformers connected in Y/Y banks has been well established, but there is still some diversity of opinion as to the proper capacity which should be allowed for in the tertiary winding, assuming that no external load is to be carried by the tertiary winding. Some of the operating companies, in order to insure sufficient capacity, specify that the tertiary windings shall have from 60 per cent to 70 per cent of the rating of the transformers. In one instance the voltage of the tertiary was made of an odd amount so that it could not be conveniently used for any purpose but that of suppressing the third harmonic.

There seems to be a feeling on the part of operating men in general that the manufacturers should give more attention to the standardization of certain parts subject to failure, such, for instance, as the high voltage bushings on transformers and switches. One of the manufacturers has already done considerable work in standardizing on bushings for a certain range of voltage, and it is promised that additional development will be done along this line. There really seems to be no reason why much additional advantage cannot be realized from such standardization since it would do much to reduce the necessary spare parts and should really have some effect toward reduction in cost. The committee suggests that a standard flange and flange drilling for various voltages would be very desirable for the reason that all the manufacturers could then supply their equipment with an arrangement for such flange drilling and in this way allow for interchange of bushings if it became desirable or necessary to do so.

One new development which was reported on was the so-called "Inert Aire" transformer. In this type of transformer, which has been developed by the Westinghouse Electric & Manufacturing Company, the customary air space in the top of the transformer tank above the surface of the oil is filled with nitrogen. A small nitrogen generator is supplied with the transformer to make up for any leakage that may occur, the purpose of the arrangement being to remove oxygen from contact with the oil in the transformer so as to prevent the deleterious effect which is noticeable in transformer oil subjected to high temperatures in the presence of free air.

Installation and Operation of Underground Systems

By E. R. Northmore*

ONE of the important developments this year is the installation of large 35,000-volt sector cable, which is being installed by one of the companies in a separately constructed 8-duct conduit built with a 6-in. water main in the center. This new method of keeping the cable and ducts cool is very interesting and the committee is anxiously waiting to see the completion of this work so that tests can be

made to ascertain the benefit derived by cooling the cables by this method.

Changing Methods of Construction

The practice of a number of the companies on the coast has been to install overhead transformers, fuses and switching equipment and then seal the manholes, attempting to keep the ducts and vaults dry and not make an all-lead job in their underground construction, but the companies are gradually changing their method of construction so that all underground work will be all-lead and all transformers, fuses and junction boxes will be absolutely waterproof so that no damage can be done should the manholes and ducts be flooded with water. One of the companies is just completing an all-lead job in the City of Long Beach and has added to this equipment a complete set of underground telephone cables so that its underground department can communicate with its substation from any manhole.

Providing More Duct and Cable Room for Future Use

The committee is of the opinion that in all future underground construction more room should be allowed for additional future capacity; in other words, more ducts should be provided and the manholes should be made as large as possible, for past experience has shown that a large amount of money is spent each year in enlarging present manholes and adding increased duct facilities. The cost of enlarging a manhole with the additional cost of re-racking and cutting over cables is so heavy that it will pay the companies to make ample provision for all future development when the ducts and manholes are first installed. For the last year, in the City of Los Angeles, there has been an average of not less than fifteen manholes or vaults in the course of reconstruction for the purpose of increasing capacity and make room for switches and other apparatus. This constant tearing up of the streets and blocking the traffic is very irritating to the public and places the utility companies in a bad light with the public, who cannot understand why we did not make the necessary provision for our work when we first installed our conduits.

Installing Transformers in Buildings

On account of the large a. c. load in some of the modern fireproof buildings it has been found advantageous to have the owners build transformer rooms in the basements of these buildings. These vaults, ventilated to the outside, are more convenient for the utility companies and at the same time are advantageous to the property owner in that the switching apparatus, fuses, etc., are more accessible, and in an emergency their own engineer can replace fuses and do the necessary switching to insure service which would not be possible if the transformers were located in manholes in the streets.

Standardization of Underground Equipment

The standardization of underground equipment, such as primary fuses, cutouts, junction boxes, etc., is strongly recommended, with particular attention being paid to making this style of equipment as compact and small as possible, for some of the equipment now made for underground construction is so large and bulky that it is almost impossible to install them in the ordinary manhole with the other necessary equipment found in these manholes.

From investigation and tests the committee is of the opinion that the insulation thickness of high voltage cables should be ample to safeguard against cable failures, that it is not considered economic to save on paper and lead while insulation failures of two or three per hundred miles were experienced and that the companies could well afford to pay a little more for the additional insulation.

The special committee appointed last year to investigate cable operating temperatures have not made their final report, but are collecting some very valuable information which will be available shortly.

*Underground Systems Committee: E. R. Northmore, chairman; R. R. Cowles, Vinton Smith, Paul E. Chapman, N. B. Hinson, R. C. Powell, N. D'Oyly, C. A. Heinze, George H. Hager, H. C. Keesling, K. B. Ayres, C. H. Holladay.

Oil Circuit Breaker Development

By H. Michener*

WITH all large companies the circuit breaker problem has become very serious because of the excessive cost of circuit breakers which will interrupt the enormous quantity of energy being fed into a short by the system. These systems are constantly demanding larger and larger switches and more of them.

This problem may be attacked either by increasing the capacities of the circuit breakers or by rearranging the system.

The capacities of the circuit breakers may be increased either by making changes in those already installed or by replacing them with new switches. If it is possible to adequately increase the capacity of those already installed, that would be the preferable way. However, there is very little general information as to what can be done in this way. There have been a few isolated cases in which work of this nature has been done along such lines of replacing the old switch tanks with stronger tanks, giving the switch blades greater travel, installing baffled vents on the switch tanks, and increasing the number of breaks per pole. It would be

very desirable, from the operating man's standpoint, if the manufacturers of oil switches would distribute information in regard to what can be done to increase the capacities of their various types of switches.

There are two methods of rearrangement of the system which may be used either jointly or separately, to reduce the duty upon circuit breakers:

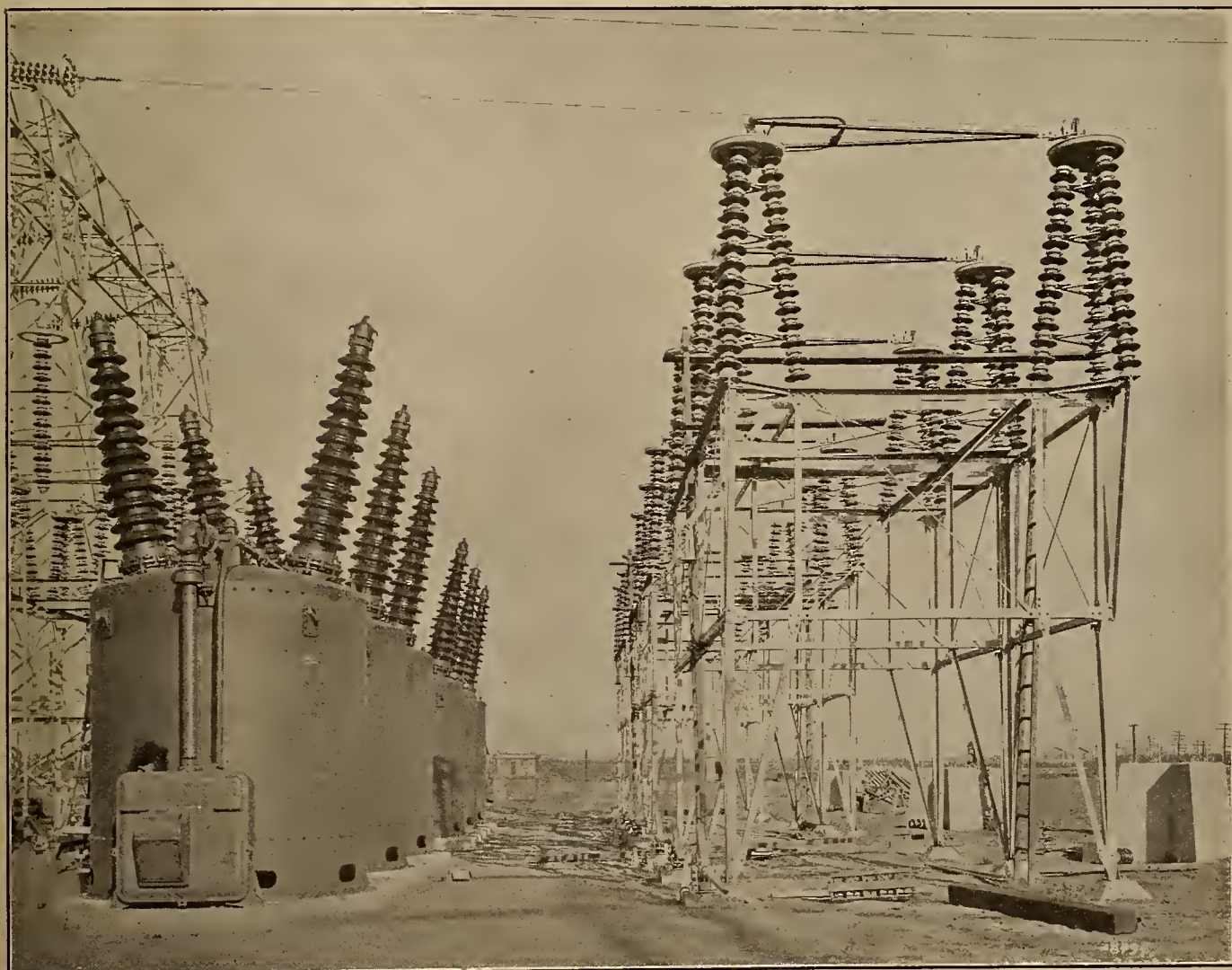
First: The system may be divided into two or more partial systems, each one having its own generation, transmission, distribution and load. These partial systems may be operated as independent systems, except for the shifting of load and generating capacity from one to the other as conditions require, or they may be tied together, each to the adjacent one, by one set of adequate circuit breakers which will open immediately on the occurrence of trouble and thus separate the partial-systems. Then the circuit breaker on the partial-system on which the trouble has occurred will have to open only the short circuit current supplied by the synchronous machines on that partial-system. This method of dividing the systems has not been extensively used but it appears that the larger systems of the Pacific Coast must adopt it within the next few years if they wish to keep the cost of circuit breakers within reason.

Second: The connections in each individual station may be arranged so that a smaller number of circuit breakers will be used. In doing this, care may be exercised to see that some of the troubles due to inadequate arrangement of circuit breakers, which were encountered in the earlier days of the industry, are not forgotten.

Since substation design is not a part of this sub-committee's work, we will follow this subject no farther.

In further reference to the increase of the rupturing capacity of circuit breakers already installed, it should be

*Oil Circuit Sub-Committee of Apparatus Committee: H. Michener, chairman; S. J. Lisberger, F. V. Wright, E. A. Quinn, P. O. Crawford, E. R. Northmore.



Arrangement of 220-kv. oil circuit breakers at Laguna Bell Substation of Southern California Edison Company.

noted that one manufacturer reports that mufflers (baffled vents), when installed on circuit breakers with round tanks, will greatly increase the rupturing capacity but when installed on breakers with rectangular tanks little or no increase in rupturing capacity is obtained because of the weakness of the tank.

These mufflers are arranged so that any oil which is thrown into them will be drained back into the switch tank. The three mufflers, one on each tank of the switch, should be connected to a manifold which should lead to the outside of the building if the switch is installed in a building. This is to prevent the discharge of explosive gases inside the building. This is to prevent the discharge of explosive gases inside the building.

This same manufacturer reports that in some cases an increase in rupturing capacity may be gained by strengthening the connection between the round tank and the cover so that they will not stretch and let oil escape when the circuit breaker opens a short circuit.

Another manufacturer has increased the rupturing capacity of one of his lines of circuit breakers by using a cover of greater strength. These stronger covers can be purchased and placed on switches now in operation.

Carrying Capacity of Circuit Breakers

The carrying capacity of circuit breakers is usually stamped on the name plate by the manufacturer. It often occurs that in buying equipment for a station, the purchasers specify breakers of two capacities—say 100 amp. and 200 amp. The switches are installed. Later the system conditions change so that the circuits connected through the 100-amp. switches carry more than 100 amp. The operator begins to get worried. He probably will recommend that larger switches be installed and his recommendation may be followed. And then it may be discovered that the 100-amp. switches have just the same current carrying parts as the 200-amp. switches.

There seems to be no reason against marking circuit breakers with their actual current carrying capacities (all based upon the same assumptions), even if for mechanical reasons this capacity is greater than that ordered. This practice, if adopted, would save considerable "research" work.

Bushings

It would be very desirable to have the bushings for one make of switch interchangeable with the bushings of any other make of switch for the same voltage classification. This will not be nearly so easy to accomplish as in the case of transformers, for the reason that in most makes of switches the bushings are used to support the stationary parts of the switch contacts. However, the advantage to the operating companies would be so great that it is hoped that the manufacturers will find some way to at least partially obtain this interchangeability.

Compound filled bushings seem to be a thing of the past. Considerable trouble with them has developed during the past three or four years, and they are quite generally abandoned, oil being used where any filling is required.

Accessibility

It is very important to have the contacts of switches easily accessible for inspection and repair. This is accomplished in the small and moderate-sized switches by having the switch elevated on a frame work so that the tanks can be lowered by some type of lifting device which is provided with the switch.

On large switches a manhole is placed in the cover of each tank so that a man can go into the switch after the oil has been removed.

The Westinghouse company has developed a periscope which can be used to inspect the contacts without removing

the oil. It is provided with a light to illuminate the parts being inspected.

Interlocking Disconnecting Switches with Circuit Breakers

Year after year the industry drifts along, saying "Ain't it awful" that so much trouble is caused by opening disconnecting switches while they are carrying load? Do we mean it? If so, why do we not find some simple way of interlocking the disconnecting switches with the circuit breakers? This has been done quite simply in in-door low voltage stations where the disconnecting switches are in cells, by interlocking the cell doors with the circuit breakers. Will someone please tell us how to do it in outdoor stations?

Power Required to Operate Circuit Breakers

The operating companies have been quite concerned with the amounts of power required to operate large circuit breakers of recent make. The storage batteries, battery charging sets and control wiring becomes items of considerable expense where large amounts of power are required.

Direct current is generally used for the operation of large switches. Some of the 220-kv. switches recently purchased required from 200 to 250 amp. at from 90 to 125 volts to close them. Others require as high as 500 amp. for closing.

Some 150-kv. switches required approximately 160 amp. to close them.

When switches requiring these heavy closing currents are located considerable distances from the source of d.c. power, the conductors leading to the solenoid must be large to keep the voltage drop within a reasonable limit. It looks rather foolish to see a 300,000 or 400,000-c.m. cable connected to the No. 8 or No. 10 wire of the solenoid, but, nevertheless, it is necessary.

As a source of d.c. power for the operation of circuit breakers, some companies make a general practice of installing storage batteries and battery charging sets, while other companies follow this practice only at substations which have no prime movers and where there are prime movers either steam or water driven control sets with a motor driven set for standby are used instead of storage batteries.

Alternating current control for circuit breakers would be very desirable in many places, especially in automatic stations, but the large amount of power required is a great drawback to its use.

One manufacturer reports that one class of breakers rated as high as 500 amp. at 7,500 volts requires a 5-kva. transformer to supply power for closing; another class rated at 300 amp. at 15,000 volts requires a 10-kva. transformer; and another class rated at 600 amp. at 25,000 volts requires a 15-kva. transformer. The preferable voltage on the solenoid is 440 volts. It is the initial, almost instantaneous, rush of current that determines the size of transformer required.

The Kelman Electric & Manufacturing Company has developed a new 15-kv. single tank oil switch which is somewhat of a departure from the usual trend of development.

This switch is rated at 300 amp. and has six breaks per pole. It is contained in a ¼-in. cylindrical steel tank approximately 3 ft. in diameter and 4 ft. high, with rounded bottom and cast iron cover. The cover carries six 15-kv. bushings, three of which are equipped with bushing type current transformers. This switch is arranged for solenoid operation, air operation with solenoid control of the air valves, or for hand operation. The solenoid operation requires approximately 75 amp. at 100 volts to close the switch. The air operation requires 80 to 100 lb. of air pressure to operate the switch and approximately 10 amp. at 32 volts or 25 amp. at 12 volts to operate the air valves.

The switch is supported from the cover so that the tank may be lowered for inspection and repair of the contacts. Means are provided for attaching two ½-ton chain blocks between the cover and tank for lowering and raising the tank.

Report of the Relay Sub-Committee

By E. R. Stauffacher*

THE work of the Relay Sub-committee has been carried on almost entirely by correspondence, except for the work done at the engineering conclaves at San Francisco in November and at Fresno in March. At the time of the conclave in Los Angeles the sub-committee had not been organized a sufficient length of time to accomplish much work.

In outlining the work of this sub-committee it was felt that it would be well to make a study of the application of relays on the Pacific Coast central stations, and to collect information concerning the use of relays in old stations, as well as in the newer stations, where modern relay protection is provided as an essential feature of the plant design. It was also apparent that it was quite desirable to agree on some uniform method of recording transmission line troubles and the operation of relays in clearing the trouble to the end, that a study could be made of such tabulated data and conclusions reached as to the class of troubles to protect against under Pacific Coast conditions. Such a study should result in the reaching of conclusions as to the effectiveness of various kinds of relay protection and would serve to indicate where relay protection could be applied most effectively.

In line with this program, the work of the sub-committee was classified under the following subjects:

1. What is the practice of the Pacific Coast central stations regarding the installation of modern relays in (a) old stations, (b) new stations under construction, or in the process of design?
2. Are any particular class of relays favored as a general rule, covering all installations, or is each relay application considered on its merits?
3. What is the present practice in regard to differential protection of generators against internal trouble?
4. What is the practice concerning the application of differential protection against internal trouble in large power transformer banks? Can any conclusion be reached regarding the smallest size of transformer which justifies this protection?
5. Bushing type current transformers and their use for the operation of relays.
6. What is the present practice as regards the use of modern induction type relays on feeders operating at 15 kv., 10 kv., 4.0 kv. and 2.2 kv.?
7. Methods of keeping a record of troubles and the action of relays in clearing these troubles. Development of a standard form of record which could be adapted to general use by the Pacific Coast systems.
8. Summarizing the various kinds of trouble experienced on the transmission and distribution lines of Pacific Coast companies to the end that efficient relay protection can be provided. This would also have the result of determining which kind of trouble it is most necessary to protect against.
9. New relay schemes or applications which have developed during the past year.

In summarizing the practice of Pacific Coast companies, your committee would report that the practice of six large companies is as follows:

- 1—(a). Wherever changes are made and plants and substations are being re-constructed it is the practice of the Pacific Coast companies to replace, as far as possible, the obsolete plunger type relays by modern induction type. Some of the companies have been very active in the change from the old to the newer type of relays, whereas others have only gone to the extent of changing such equipment on the most important incoming and outgoing lines. One company reports changes in approximately forty substations in addition to several generating plants, while another company reports that plans have been perfected and the work is under way to change from plunger type to induction relays in all of the important generating plants and substations throughout its system.
- (b). All companies reported that new stations are being equipped with modern protective equipment. This includes a full complement of relays to protect against line troubles, transformer and generator troubles, as well as troubles which might develop in synchronous condensers and frequency changers. To provide the best possible service to consumers it is also the practice to install modern relays in almost all of the outgoing feeders.

2. In regard to what class or type of relay is favored, all are agreed on the induction relay. Under identical conditions, however, some companies favor the current balanced type, where it can possibly be applied, while others prefer the directional type as a general rule. One company reports that it prefers to consider each application as a special case and use the most suitable type of relay obtainable, often changing the relay according to its own ideas.
3. Five of the companies reported that all new generators when installed are equipped with the differential system of protection against internal faults. The specifications for each generator calls for the bringing out of both ends of the generator winding so that the proper current transformers may be readily applied. The current transformer secondaries are so balanced and connected to a low energy relay that the flow of current to ground due to a generator fault will cause the relays to trip the armature and field switches. It is agreed that the differential method of protection offers the best means of preventing extensive damage to the iron laminations and winding of generator or synchronous condenser.
4. Differential protection against internal trouble in large transformer banks is the accepted practice with five companies. Two of the companies use a bank of 3-5,000-kva. transformers as the lower limit at which to apply such protection, while one company makes the lower limit 3-4,000-kva. transformers, and another makes the limit 3-3,700-kva. transformers. Our company applies a special method of protection when two transformer banks are operated in parallel.
5. All companies reported successful use of bushing type current transformers for the operation of relays protecting high tension lines. Care should be taken, however, to calibrate the relay and bushing type current transformer as a unit by means of sending a low voltage current through the primary of the current transformer.
6. All of the companies report that inductive type relays are used on distribution feeders operating at the higher voltages, such as 10 kv., 15 kv. and 33 kv. Only occasional use is made of the induction relay on 4-kv. and 2.3-kv. feeders, where an important power load is fed. However, at these lower voltages the majority of the companies agree that induction type relays should be used.
7. There is no uniform method of keeping a record of the interruptions and relay operations amongst the various companies, and it is generally agreed that some uniform report could be used to advantage in making a study of the relay operations. The interruption analysis sheet, as suggested by the Protective Devices Committee of the A. I. E. E., was favorably considered, and it will no doubt be used as a model for future studies of relay operations.
8. An attempt was made to gather a summary of the various kinds of troubles which are experienced during typical conditions during 1922. Three of the companies prepared such a summary and sent it in with their report. It is felt that a summary of troubles, carefully kept for a few years, should give a good basis upon which to determine where relays could be applied to the best advantage.
9. A few of the companies submitted some relay applications which are comparatively new and the wiring diagrams are attached to this report.

The scheme for the protection of transformers submitted by the San Joaquin Light and Power Corporation has been previously mentioned in the section devoted to differential protection of transformers. Applications of combined overload and residual current directional relays have been submitted by the Pacific Gas and Electric Company—a wiring diagram of which is attached to this report.

The Southern California Edison Company is applying current balanced relays on its Big Creek 220-kv. lines for the purpose of isolating a section of the line upon the occurrence of a flashover. In addition to this automatic rheostat or flashover suppressors are being installed in the power houses and substations containing synchronous condensers. A detailed explanation, with wiring diagrams illustrating this system, is attached to this report.

10. Two of the large manufacturers of electrical machinery have been very active during the last year in the designing and building of relays for many purposes. The automatic generating plants and substations have created a demand for a number of special relays, in addition to the special relays applied on the various transmission lines. Herewith is submitted a detailed list of relays manufactured by two of the larger manufacturing companies.
11. A universal system of symbols for automatic switches designating the type of relay and connections used would be quite desirable and a set of such symbols is herewith submitted. These symbols are incorporated in the Electric Standards of the Southern California Edison Company.

The Relay Committee could follow this matter up as a part of its next year's work to the end that some steps may be taken in the universal adoption of standard symbols.

The relay practice of the San Joaquin Light and Power Corporation is written up in detail and is attached to this report with a diagram and photographs of the testing outfit used on that system.

Protective Equipment for the Control of Flashovers

As a means of isolating the defective section of the Big Creek transmission line at the time of a flashover, use is made

*Relay Sub-committee of Apparatus Committee: E. R. Stauffacher, chairman; C. W. Benham, J. Bridges, R. C. Denny, R. H. Halpenny, O. W. Holden, J. Mini, W. H. Talbott, E. E. Valk.

of induction type relays along the transmission line, as well as automatic trouble rheostats at each of the generating plants and the substation where synchronous condensers are installed.

The protective equipment is divided into two groups:

1st. Induction type balanced relays, so designed and connected that when the two transmission lines are operating in parallel the current in one phase of one of the lines is balanced against the current in the similar phase of the remaining line. These balanced relays are also operated, in some cases, in conjunction with definite minimum inverse time induction type overload relays. When a flashover occurs there is a rush of current to the point of short circuit on the line with a consequent unbalance of the current in the two lines operating in parallel. This current unbalance will cause the relays to function at each end of the particular section of the transmission line in trouble, and the proper oil circuit breakers will be tripped out so that the trouble will not be communicated to the remaining portion of the system.

2nd. Automatic trouble rheostats with the necessary auxiliary relays and operating mechanism are used to lower the voltage at each of the generating plants at the time of a flashover or transient flow of current to ground. This equipment is intended to come into play when the two transmission lines are operating out of parallel or when one of the sections of either of the lines is out of service for any reason. The characteristics of the transmission line is such that it would be dangerous to sever the transmission line, consequently under the above conditions it is necessary to control a flashover by means of lowering the voltage till the arc is extinguished and then to gradually raise the transmission line voltage to normal.

The detailed application of the protective equipment is as follows:

Balanced Relays:

At Big Creek No. 1: Each of the six 220-kv. to 150-kv. auto transformers which constitute the two banks has a current transformer in the grounded side of the windings. Each of these current transformers is connected to the corresponding phase in the two banks to a suitable induction type balanced current relay. The relays are so connected as to function upon the occurrence of trouble in the line; that is, when current flows to ground and will cause the 150-kv. oil circuit breakers supplying the faulty line to trip out automatically. This will isolate the faulty line. In case any trouble should occur on the second line it will not trip out automatically at this plant and it will be necessary to automatically lower the voltage to clear the trouble.

At Big Creek No. 2: Identical with Big Creek No. 1.

At Big Creek No. 8: Bushing type current transformers are installed in the bushings of the 220-kv. oil circuit breakers. These bushing type current transformers will be connected to induction type balanced relays and the operation will be similar to Big Creek No. 1 and No. 2, in that the first line will be automatic and the second line will be non-automatic.

Big Creek No. 3: The bushing type current transformers in the oil circuit breakers of the incoming lines from Big Creek No. 1, No. 2 and No. 8 are connected to induction type current balanced relays. When trouble occurs these relays will cause the oil circuit breakers feeding the line in trouble to trip out. The remaining lines are automatic by using suitable induction type overload relays.

Vestal Substation: The bushing type current transformers in the grounded side of the auto-transformers are connected to induction type current balanced relays, similar to Big Creek No. 1 and No. 2. The first line in trouble will be cleared automatically, but the second line will be non-automatic.

Magunden Substation: As no auto-transformers are used here the necessary bushing type current transformers are installed in the 220-kv. oil circuit breakers and are connected to induction type current balanced relays, so that the faulty line will be cleared at the time of trouble, leaving the remaining line non-automatic.

Eagle Rock Substation: Induction type current balanced relays are connected to the secondaries of bushing type current transformers, which are connected in the grounded side of the auto-transformers. This connection is the same as the connections at Big Creek No. 2 and No. 1. The first line in trouble will be cleared automatically, leaving the second line non-automatic.

Lagunabell Substation: Induction type power directional or reverse power relays are used in conjunction with definite minimum inverse time induction type overload relays. The necessary connections are made to the secondaries of bushing type current transformers, installed in the bushings

of the 220-kv. oil circuit breakers. When current flows from this substation at the time of trouble on the section of the 220-kv. line between Magunden, Eagle Rock and Lagunabell, the faulty line will be cleared at each of these points. Lagunabell also uses the system of isolating the first line in trouble, but keeping the second line non-automatic. It is, therefore, necessary to provide some means (the details of which will be explained later) of controlling the second line under this abnormal condition.

Automatic Trouble Rheostat

The duty of the automatic trouble rheostat is to automatically lower the voltage at the generating stations and substations equipped with synchronous condensers and to automatically lower the machine excitation in case of excess voltage due to cutting a generator free from the transmission system.

The details of the equipment installed to accomplish this are as follows:

At Big Creek No. 1: Low energy induction type relays are so connected in the secondaries of bushing type current transformers, which are installed in the grounded side of the auto-transformer windings so that a flow of ground current, due to a flashover, will cause the relay contacts to close. This will operate auxiliary relays, which in turn will cause a motor to operate which is geared to a suitable auxiliary generator rheostat, known as a trouble rheostat. This will lower the voltage of the generators until the flashover arc breaks and the ground current ceases to flow. The master low energy relay will then open its contacts and the motor geared to the trouble rheostat will then reverse its direction of travel, bringing the generator voltage up to normal. The speed of the motor is such that the generating voltage will be lowered in a period of approximately ten seconds and the voltage is raised from zero voltage to normal voltage in approximately twenty seconds. Therefore, under the worst conditions a flashover should be cleared in a period of one-half of a minute. Provision is also made to open the master switch of the generator voltage regulator at this time, if it is found necessary to lower the voltage at a much more rapid rate of speed.

In addition to the above equipment a suitable curve drawing ammeter is connected in series with the master relay for the purpose of studying the action of the flashover arc, the magnitude of the ground current, and the manner in which the trouble was cleared. This ammeter is so designed that the normal chart speed will be three inches per hour, but at the time of a flow of ground current the chart speed will automatically change to three inches per minute. When the flashover breaks the speed will automatically return to normal.

To protect against a rise in generator voltage when, for any reason, the load is suddenly dropped, an induction type voltage relay is installed across the secondary of a potential transformer, which is connected to the generator bus. The relay contacts are connected in parallel with the master relay contacts and thus upon the occurrence of high voltage the trouble rheostat is brought into play until the voltage is lowered to normal.

Big Creek No. 2: The same equipment as used at Big Creek No. 1 is installed.

Big Creek No. 3: The same general scheme of control as Big Creek No. 1 and No. 2 is used, although the details are somewhat different. As this station has no auto-transformers the bushing type current transformers are connected in the 220-kv. transformer neutrals.

Big Creek No. 2: The same equipment as used at Big Creek No. 1 and No. 2 is used.

Vestal Substation: At this substation the equipment for lowering the exciter voltage of the 50-cycle to 60-cycle 15,000-kva. frequency changer is practically identical with that used at Big Creek No. 1, No. 2 and No. 3.

Eagle Rock Substation: The master switch relay is connected in the secondaries of the bushing type current transformers used in the auto-transformer neutrals. When the relay contacts close, due to a transient flow of current to ground, the master switch of the Terrill regulators controlling the three synchronous condensers is opened. This will allow the machines to operate as induction motors until the trouble is cleared. The Terrill regulators are then manually restored to service.

Lagunabell Substation: The general scheme of controlling the synchronous condenser at this substation is the same as used at Eagle Rock. The relays are different in their details and connections are made to the secondaries or bushing type current transformers which are in the neutrals of the 220-kv. transformers. As this station was originally designed for 220-kv. operation, there is no need of 220-kv. to 150-kv. auto-transformers, as is the case at Eagle Rock.

*SUMMARY OF INTERRUPTION

| CAUSES | VOLTAGE | | | | | | |
|-------------------------------------|---------|--------|--------|--------|---------|---------|-------|
| | 10 Kv. | 15 Kv. | 30 Kv. | 60 Kv. | 110 Kv. | 150 Kv. | Total |
| 1 Unknown | 73 | 18 | 7 | 32 | | | 130 |
| 2 Insulator Failure | 18 | 8 | 6 | 31 | | | 63 |
| 3 Mistake in Switching | 4 | 3 | | | | | 7 |
| 4 Trees in Line | 5 | 2 | | | | | 7 |
| 5 Pole Burned | 3 | 2 | | | | | 6 |
| 6 Lightning and Flashovers | | | | 1 | | | 4 |
| 7 Birds, etc., Getting in Line..... | | | | 1 | | 3 | 4 |
| 8 Brush Fires | | | | 9 | | | 9 |
| 9 Pole Broken | | | | 1 | | | 1 |
| 10 Oil Switch Failure | 2 | 2 | | 1 | | | 5 |
| 11 Failure of Other Apparatus..... | 6 | 4 | | 1 | | | 11 |
| 12 Line Wires Blown Together..... | 6 | 12 | 7 | 1 | | | 26 |
| 13 Pole Blown Over | | 1 | | | | | 1 |
| 14 Accidents | | 3 | | 2 | | | 5 |
| 15 Arrester Trouble | 9 | 2 | | 3 | | | 14 |
| 16 Bushing Failure | 1 | | | | | | 1 |
| 17 Line Failure | | 1 | | | | | 1 |
| 18 Trouble on Other Lines..... | | 1 | 3 | 1 | 1 | | 6 |
| | 5 | 15 | | 2 | | | 22 |
| Total, | 132 | 74 | 23 | 86 | 1 | 3 | 319 |

* 2 Months' Operation of 3 Companies during 1922.

Conclusion: In the majority of flashovers there will be no occasion for the automatic trouble rheostats to come into action, as the current balanced relays will clear the trouble immediately. The trouble rheostat will only have occasion to function when the 220-kv. lines are operating out of parallel or when, for any reason, one of the lines is out of service. At present the 220-kv. line is divided into three main sections, but it is planned to ultimately divide the line into six sections, each of which will be approximately forty miles long.

Relay Practice—San Joaquin Light & Power Corporation

It is the practice of the San Joaquin Light & Power Corporation to make a test on all overload and power directional relays whenever possible by means of applying a known test current through the switch and current transformer and measuring the current in the secondary of the current transformer, the tripping time of the switch and also the "mechanical time" of the switch. By "mechanical time" is meant the time measured from the closing of the relay contacts to the actual opening of the switch contacts. When testing power directional relays the directional contacts are blocked closed and the relay tested for time. Then the directional contacts are unblocked and this feature is checked by noting position of directional disk for a known direction of flow of power.

The outfit used for setting relays on the San Joaquin Light & Power Corporation's system is mounted on a small trailer which is hauled to the point where test is to be made by the substation inspector. It can very easily be moved to a point near the switch or other piece equipment to be tested by hand after arrival at the substation or power house.

The testing outfit itself, consists of a 2-kw. Westinghouse sign lighting transformer with a 220-volt primary winding and a 10-volt or 20-volt secondary. There are two carbon disk rheostats in the primary circuit, one of 4—500-watt units and the second of 1—250-watt unit. These are normally all connected in series. For high current values the 4 units of the first rheostat can be connected in parallel and the second rheostat short circuited. There is a 2 to 1 potential transformer connected across the supply circuit to obtain 110 volts for the cycle counter. The range of this equipment is from about 10 amp. to 400 amp. The lower values are obtained by applying 110 volts to the primary of the testing transformer.

The instruments used with this equipment are a portable voltmeter of 600-volt range, a low reading voltmeter with 1.5 and 15-volt scale, ammeters to give accurate readings from 5 to 300 amp. and a 500 to 5 current transformer for higher readings. All time readings are obtained by means of a cycle counter. Phase rotation is obtained when necessary by means of a phase sequence indicator.

It has been found very convenient to measure the resistance of switch contacts by means of the low reading voltmeter while making tests of relay and switch operation. This gives the tester an idea of the condition of the blade contact and takes hardly any additional time.

The above described equipment has proven very convenient and satisfactory but is hardly of great enough capacity for an adequate test of inverse time relays. This company has ordered a small regulator and General Electric type M transformer which will be capable of supplying up to 1,000 amp. The addition of a current transformer of like capacity will complete the outfit.

It has been found necessary to make a very careful check of the connections in each new installation of directional overload relays to insure proper operation. This test is made by a representative of the meter department.

The standard arrangement at each substation is as follows: The 60-kv. bus is connected through an oil circuit breaker at either end to the incoming and outgoing lines.

Each of these circuit breakers is equipped with bushing type current transformers which are connected to single-phase directional overload relays.

The station bank is connected star-star. On the low side is connected a potential bank which is also connected star-star. Half taps are brought out in the low tension winding of the potential bank and the directional elements of the relays are supplied from the proper pair to give a potential which lags 30° behind the corresponding phase potential.

In wiring the bushing type current transformers, conductors with different colored braids are used so that they can be readily traced through the conduit. The same scheme is applied in the potential wiring.

To determine the phase sequence the phase sequence indicator supplied by the States Company has been used. This piece of apparatus has proven very satisfactory. Occasionally use has been made of a device similar to that described by Mr. Varley in an article in the *Electrical World* several years ago. This device consists of two lamps and a reactance.

After ascertaining the proper potential to combine with each of the phase currents, arrangements are made with the system dispatcher so that power may be transmitted by the station in a definite direction. This permits a check on the directional elements and the permanent connections are made so that the relays will give operations for the prescribed direction.

The maintenance testing is handled by the substation inspection crews on the San Joaquin system. An inspection is made of each substation at least once a month and the more important suggestions receive two inspections per month. The inspectors work directly under the division electrical superintendent and receive their instructions regarding tests to be made from his office. The desired information regarding time and current settings for all transmission line switches and transformer switches that are equipped with relays is given to the division electrical superintendent by the operating engineer of the company by means of a relay test tag. When the relay setting called for is made, the relay test tag is filled out in duplicate, one copy being retained in the division electrical superintendent's files and the other forwarded through the road dispatcher to the operating engineer.

The load dispatcher's office is notified by the inspector that he is ready to make a maintenance test of a switch and if operating conditions make it possible the switch is taken out of service long enough for him to thoroughly test the action of the relay and switch. This is usually possible in the case of transmission switches on the San Joaquin system owing to their loop system which allows of the "killing" of a section of line between two substations without dropping any load, or to their practice of installing "bypasses" around transmission switches and transfer buses for distribution switches. When the inspector obtains his clearance on the desired switch he trips the switch several times and carefully notes the action of the relay, trip coil and switch mechanism. He examines all wiring for loose or faulty contacts and carefully looks over the relays for mechanical defects. If any are found he either repairs them or gets a spare relay and installs it and returns the defective one to the meter department for repair. He is particularly careful to see that all contacts within the relay are clean and in good condition. If the relay is of the bellows type he sees that the leather is flexible, using a very little neats foot oil if necessary. In the case of power directional relays he checks them for proper directional setting by learning from the load dispatcher the direction of flow of power after he has cleared on the switch under test and it has been put back in service. If, owing to conditions of load or trouble it is not possible to get the switch to be tested out of service,

the inspector "blocks" the mechanism of the switch mechanically and tries out the relays.

The principal items of trouble with induction type relays are dust or corrosion of contacts of relay or auxiliary contactor switch, burning out of auxiliary contactor switch coil due to failure of pallet switch to open trip circuit and the loosening of a bearing so that disk drags on the magnets.

With bellows type relays the time is quite variable due to change in the flexibility of the leather. In the circuit opening type where they are subjected to heavy current values the contacts sometimes burn "closed" thus making the relay inoperative. In the circuit closing type the contacts sometimes stick closed. This can usually be obviated by the use of the quick return valve attachment.

In addition to the above maintenance test of relays a

complete overall test of the action of relays and switches is made by means of the relay testing equipment at least once every six months. In this test a known current is applied through the switch and current transformer and readings of secondary current and of tripping time are noted for each relay.

Also the mechanical time of the switch is noted and any readjustments or repairs are made that are found advisable and the switch retested. This work is done by the chief substation inspector and time curves are plotted for the switch in terms of current through the switch. These curves are filed in the division superintendent's office. A record of each switch is also kept which shows date that any repairs or readjustments were made, what they consisted of and who was in charge of the work.

Uniform Classification of Accounts

By C. P. Staal*

DURING the fiscal year ending June 30, 1923, the efforts of the accounting committee were directed principally to the making of new classification of accounts. The immediate necessity for a change in classification for California arose from the fact that the Federal Power Commission, in accordance with provisions of the Federal Water Power Act, had, during the latter part of 1921 and the early part of 1922, taken definite steps looking to the adoption of a classification of accounts to provide the necessary accounting procedure for the proper administration of the act.

Inasmuch as most of the larger companies had at this time, or probably would in the near future, become subject to the rules and regulations of the Federal Power Commission as a result of taking out licenses under the Federal Water Power Act for a part of their properties previously constructed, or for new projects to be constructed, the subject of uniformity in accounting as between the state regulating authority and the Federal Power Commission became a question of vital importance to those of us who are interested in that branch of the business.

The members of the California Railroad Commission staff particularly interested in accounting matters were among the first to clearly foresee the desirability of prompt action to insure complete harmony, and accordingly made known their intention of making a revision to meet the situation if, and when, the Federal Power Commission adopted its classification of accounts.

Concurrently, at this stage of the activities along these lines the Chief Accountant of the Federal Power Commission had attempted, through various ways and means, meetings formal and otherwise, to reach an agreement with the National Electric Light Association. At a time when there seemed to be some difficulty in accomplishing his purpose, he made a visit to the Pacific Coast, which afforded an opportunity for personal interchange of ideas between him and the operating companies.

At the conferences which were had during his visit efforts were made to coordinate as far as possible accounting requirements and practices under actual operating conditions and rate regulations, with the purposes and intentions of the Federal Power Commission in carrying out its requirements under the act.

The attitude of the Federal Power Commission was found to be distinctly along the lines of meeting the practical need of the business, and the desirability of uniformity in

state and federal accounting procedure seemed to be fully realized.

With this situation as set forth above as a background or starting point for the year's work the accounting committee realized that in all probability these very important problems would be disposed of during the fiscal year. The responsibility of the committee was clearly to direct its efforts toward the building up of a classification of accounts for the state which would meet our requirements and conditions to the best possible advantage.

Five meetings were held during the year, four of which were devoted to the classification. Aside from this a great deal of time was given to this subject by several members of the committee who represented the larger companies in the state.

In all of our activities we had worked in very close contact with the members of the California Railroad Commission staff, who had this work in hand, and there has at all times been cooperation to the fullest extent.

On Sept. 18, 1922, the Federal Power Commission called a meeting for the purpose of affording opportunity for discussing a classification proposed by that commission for formal adoption, and, to represent the companies operating in the state, four companies were invited to send their auditors to this meeting. These companies were: Pacific Gas & Electric Company, San Francisco, E. W. Hodges, auditor; San Joaquin Light & Power Corporation, Fresno, A. B. Carpenter, auditor; Southern Sierras Power Company, Riverside, P. R. Ferguson, auditor, and Southern California Edison Company, Los Angeles, C. P. Staal, auditor.

The four representatives were in attendance as representatives of their respective companies and not as representatives of this association. In addition, W. C. Fankhauser, of the California Railroad Commission, attended. There were also in attendance representatives of numerous eastern companies, the committee on uniform classification of accounts of the National Electric Light Association, the Accounting Committee of the National Association of Railway and Utilities Commissioners and Carl D. Jackson, president of the latter association.

After a brief formal hearing before O. C. Merrill, executive secretary of the Federal Power Commission, during the forenoon of Sept. 18, a committee, appointed by Mr. Merrill, undertook an informal discussion of the subject, these meetings being continued daily until Sept. 27.

Mr. Merrill appointed the committee to consist of all of those present at the formal meeting who wished to attend

*Accounting Committee: C. P. Staal, chairman; A. B. Carpenter, vice-chairman; P. R. Ferguson, E. W. Hodges, L. A. Reynolds, A. C. Reynolds, P. A. Bailey, W. E. Houghton.

the committee meeting. As a result of this appointment by Mr. Merrill the personnel of the committee was the two committees referred to above, the four representatives of the California companies, W. C. Fankhauser of the California Commission, and Carl D. Jackson, who acted as special representative of counsel for the two committees. The Federal Power Commission was represented by Wm. V. King, chief accountant, and his assistant, Mr. Friede. The premise from which the reason for and the beginning of the meeting sprang seemed to be that there should be uniformity in accounting as between the requirements of the State and the Federal Power Commission. There appeared to be no difference of opinion as to this point.

However, the views of the members of the committee seemed to differ to such an extent that it appeared uncertain at the outset as to whether or not a common ground or basis could be found from which the subject could be discussed or even approached. The question at issue was as to whether the tentative draft of the Federal Power Commission or the classification of the National Association of Railway and Utilities Commissioners should form the basis for the discussion.

The discussion was finally carried forward, using the Federal Power Commission's tentative draft as the basis.

The classification which resulted and which was finally adopted by the Federal Power Commission is in reality a combination of many compromises and changes made in a sincere desire to have uniformity with all of the states, and some of us had even dared to hope that all of the changes and compromises worked out and apparently agreed upon at this conference would be embodied in the classification later

adopted by the National Association of Railway and Utilities Commissioners and approved by the National Electric Light Association. In this, however, we were disappointed.

Following closely upon the adoption by the Federal Power Commission of its classification, the California Railroad Commission called a hearing on Dec. 4, 1922, in the matter of adopting a classification to become effective Jan. 1, 1923.

The classification was drawn parallel to that of the Federal Power Commission and in due course was formally adopted on Dec. 13, 1923.

The members of this committee feel highly elated over the consummation in this very satisfactory manner of this important matter and believe that something of inestimable value has been accomplished which permits of our accounting being done in the same manner for both the California Railroad Commission and the Federal Power Commission.

The fifth meeting of the committee was devoted to formulating a recommendation to the California Railroad Commission for permission to treat Accounts 390 to 395 inclusive—"Overhead Construction Costs," as clearing accounts, distributing the entire amount of charges against these accounts to the other fixed capital accounts to which they were properly related. This recommendation has been referred to J. B. Black, president of the association, for presentation in such manner as he may consider proper.

The attention of the committee having been taken up entirely with these important matters, no sub-committees were formed and none of the other activities included within the scope of the Accounting Committee were undertaken.

Effects of Various Colored Cases on the Oil Temperature of Distribution Transformers

By E. J. Moore and J. H. Moulton

ALACK of information as to the effect on the internal temperatures of transformers produced by using various colored paints on the cases led the San Joaquin Light and Power Corporation to make a series of such tests during August and September, 1922. In making these tests the endeavor was made to duplicate operating conditions in every way. Accordingly, the structure shown in the attached photograph was erected in the yard of the Fresno O Street Substation.

The poles were placed in a north and south line, exposing the transformers to the direct rays of the sun, except for a few minutes at noon, when the shadow of the southerly pole swept across the structure. Two 6-in. x 8-in. cross-arms were bolted to the poles approximately 20 ft. above ground on which were placed four 3-kva. 6,900/220/110-volt transformers for test purposes, together with the necessary recording transformers, and two 2-kva. 2,400/220/110-volt transformers to supply the impedance voltage in the full load runs.

Purposes of the Test

The tests were made with the following purposes in view:

1. To obtain the effect on the oil temperature of transformers under no load and not excited, which various colored paints applied to the exterior of the cases would have.
2. To obtain similar information as to the oil temperatures when the transformers were excited at normal voltage, but with no other load on the windings.

3. To obtain similar information with the transformer windings subjected to full load.

4. To obtain the inherent differences of oil temperature due to variations in construction, eliminating, by painting the cases of all transformers black, all effect of case color.

Tests 1 and 2 were made as a check on certain laboratory experiments which tended to show that the color of the transformer case had a greater effect on the oil temperature at no load than at full load.

For Tests 1, 2 and 3, as outlined above, the cases were painted as follows:

| | |
|----------------------------------|--|
| Transformer A.—Black. | |
| " B.—Dark Gray. | |
| " C.—Westinghouse Standard Gray. | |
| " D.—Light Gray. | |

For Test 4, the cases of the four transformers were given two coats of black paint, which was allowed to dry thoroughly and which produced identical surface characteristics on the four transformers.

Two holes were drilled in the cover of each transformer. The lead of a recording thermometer was passed through one of the holes and the bulb located in the oil immediately above the windings. A calibrated mercury thermometer was placed in the other hole with the bulb in a similar position.

Table 1 was compiled from the detail results of the various tests and shows the maximum temperatures recorded each day.

TABLE I.—TRANSFORMER TEMPERATURE RUNS.
Daily Maximum Oil Temperature Recorded

| Date | Time P.M. | Ambient | NORMAL FULL LOAD Temperature Degrees Fahrenheit | | | |
|---------|-----------|---------|--|-----------------------|------------------------|-----------------------|
| | | | A, Case Black | B Case Dk. Gray | C Case Med. Gray | D Case Lt. Gray |
| 8-24-22 | 3:30 | 89 | 135.4 | 132.8 | 133.2 | 132.2 |
| 8-25-22 | 4:05 | 95 | 143.2 | 142.2 | 145.8 | 142.0 |
| 8-29-22 | 4:40 | 96 | 141.7 | 138.4 | 143.8 | 140.0 |
| 8-30-22 | 4:55 | 89 | 134.8 | 131.6 | 136.8 | 132.0 |
| 9- 1-22 | 5:35 | 94 | 145.9 | 142.6 | 146.5 | 141.9 |
| 9-18-22 | 4:00 | 100 | 141.5 | 140.0 | 142.7 | 140.0 |
| 9-19-22 | 5:00 | 102 | 154.6 | ..... | 153.4 | 150.0 |
| 9-20-22 | 4:00 | 99 | 145.3 | 141.5 | 144.6 | 141.7 |

Conclusions

A study of Test 4, with all cases black, shows that the characteristics of the four transformers as to their oil temperature vary somewhat. It is seen, however, that during the maximum temperature periods of each day the same relative differences in temperature are maintained. Considering transformer A as the standard of comparison, the following differences in the oil temperatures of the other transformers are noted:

Transformer A.—Zero degrees F.
 " B.—Plus 2 degrees F.
 " C.—Minus 1.2 degrees F.
 " D.—Zero degrees F.

In other words, this is the correction which, if applied to the observed temperature of the transformers when the cases were painted black, would give the same temperature for all four. It, therefore, appears that this same correction should be applied to the observed temperatures of each transformer when the cases were painted various colors before a comparison was made as to the effect of the various colors. It should be noted particularly that this correction has not been applied in compiling Table No. 1, but will be applied to values taken from this table in interpreting the tests.

Test 1 shows that during the maximum temperature period of each day there is a difference in temperature after the correction factors shown immediately above are applied, as follows:

Between transformers A and C.—C is 4 to 5° lower.
 " " A and D.—D is 8 to 12° lower.

Test 2 shows a corrected difference in the oil temperatures of the various transformers during the maximum temperature period as follows:

Between A and B.—No difference.
 " A and C.—No difference.
 " A and D.—3 to 4 degrees.

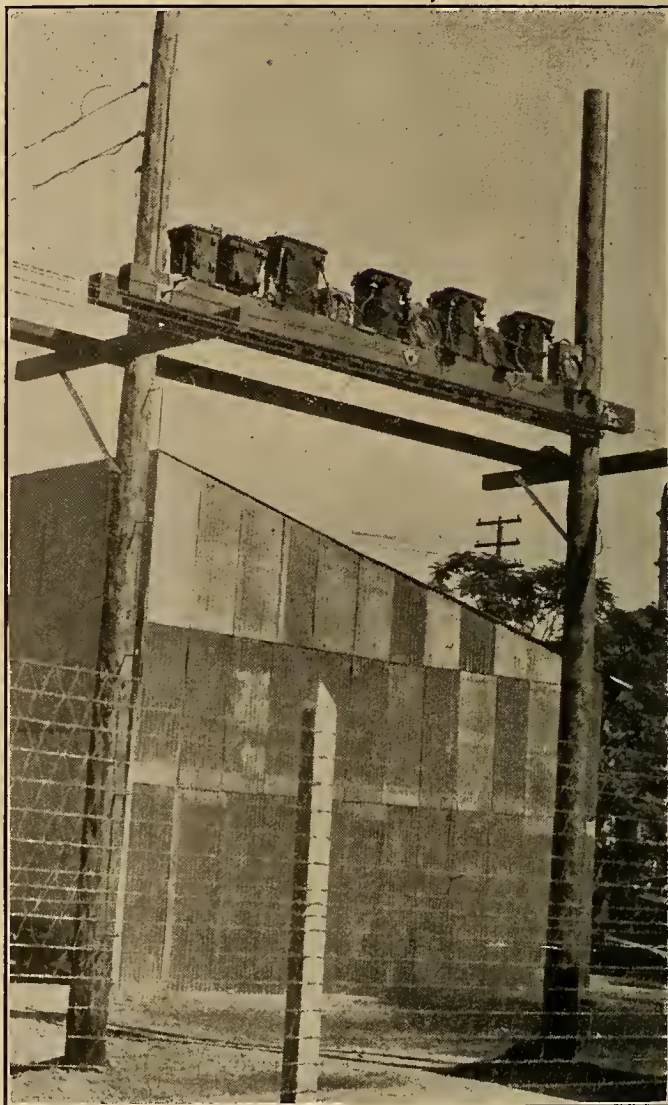
Test 3 for the transformers operating at full load shows the following corrected differences during the maximum temperature periods:

Between A and B.—B is 1 to 2 degrees lower.
 " A and C.—C is 0 to 1½ degrees lower.
 " A and D.—D is 2 to 4 degrees lower.

The number of successive days during which tests were made and the consistency of the results leaves little doubt as to the accuracy of the full load tests. The fact that a gray paint will not reduce the oil temperature more than 3 or 4 degrees F. or 1 or 2 degrees C. during the extremely hot weather encountered in the San Joaquin Valley seems established. This was a disappointment in view of the seemingly

prevalent belief that a much larger reduction for gray paint would be found.

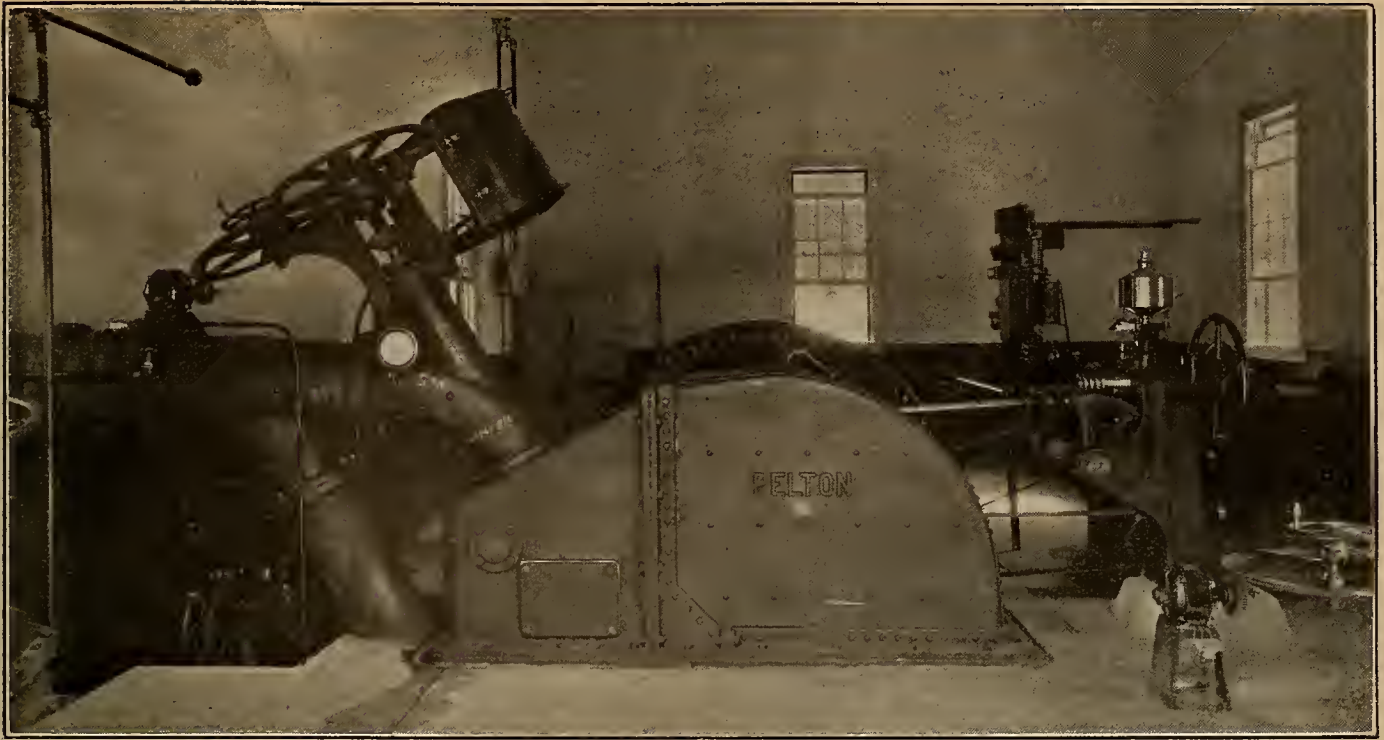
It is interesting to note that apparently when the transformers are absorbing heat, as they are during Test 1, the color appears to have an appreciable bearing on the oil temperature. It was found, however, that the transformers maintain the same relative position during all portions of this run.



Structure erected by San Joaquin Light & Power Corporation to test effect of various colored cases on oil temperature of distribution transformers under service conditions

It was expected that the black transformer which absorbed heat more rapidly during the day, and was consequently hotter at this time, would radiate the heat better at night, and consequently run cooler than the gray transformers.

We have reached the conclusion, after a very careful study of the results herein recorded, that any additional expenditure to procure a gray case in place of black would not be justified. This is in view of the fact that the differences in temperature do not under full load conditions vary any more than the differences obtained from various makes operating under identical conditions. Assuming that gray or black tanks are available at equal cost, and that experience shows that the gray paint stands up in service as satisfactorily as the black, we would be inclined to favor the medium gray tank. We feel very strongly, however, that any expenditure to repaint black cases now in service would not in any way be justified.



Interior view of power house No. 2 of the Ontario Power Company. This plant has been in operation since October, 1919.

Economies Effected by Installation of Automatic Generating Plants

By R. C. Denny*

AMONG the several companies of the Pacific Coast Electrical Association using automatic generating plants, the underlying reasons for such installations are in most cases largely the same. Usually it is a case of changing over small pioneer plants that exist on every system or those bought up in the course of a system's expansion. In their day, when the kilowatt-hour sold for more, their operation was no doubt economical, however, the large, modern plant of the present day has made conspicuous the rather uneconomical operation of these small plants. To make any good showing at all in competition with the large plant the small plants must necessarily be made over to operate, either entirely automatically or by remote control, from a more important station, and thereby eliminate the attendance expense. It is more often the case, however, that owing to the necessity of keeping one man on the property as a watchman or caretaker, the plant is found operating semi-automatically under normal conditions and requiring a certain amount of personal supervision under abnormal conditions. Thus semi-automatic operation minimizes the attendance expense and make possible the economic operation of such plants.

The personnel problem is another consideration having an important bearing on the situation. In the present day, power plant operators, while not organized as a particular body, are assuming an independent attitude toward their employers and an air of indifference toward their work. In the camps they expect the modern conveniences of the city, and even when given the best accommodations rarely show any appreciation. Their jobs are simply a means to a salary, and there their interest ends. Among professional operators the

man who shows the loyalty to his company and the interest in his work necessary to advance him to better positions is exceedingly rare. They are constantly moving from one system to another, staying just long enough to inconvenience their employer when they leave, which is usually on rather short notice. It is no small wonder, then, having this condition to contend with, particularly in small, remote plants, we find automatic apparatus coming into use to replace uncertain or unreliable labor.

There has been in the P. C. E. A. several instances of entirely new developments of small water powers in automatic installations, where low head possibilities had not been utilized owing to high production costs under the old scheme of operation. These developments have been based largely on the successful application of automatic apparatus in old plants and the consequent good results obtained therefrom. The confidence gained through actual results obtained will doubtless lead to many entirely new automatic plant developments.

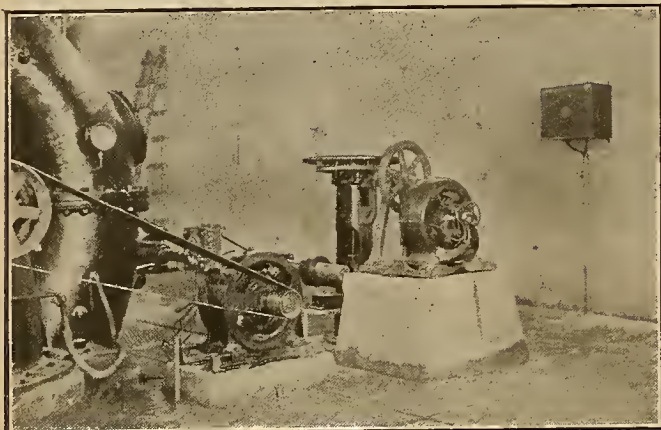
On the systems of the three member companies who are actually pursuing this practice in small generating plants there are some fifteen automatic or semi-automatic installations in actual use and several others either under construction or planned. Some of these plants in their operation are fulfilling other purposes than merely that of adding kilowatt-hours to their systems' output. They may be regulating the flow of stored water to other more important plants below or to irrigation districts, and accomplishing it quite as reliably as would an operator who was subject to forgetfulness (as some are at times). Another valuable purpose that these small plants often fulfill is that of giving service to remote or outlying distribution systems when segregated due to sys-

*Sub-committee on Automatic Generating Stations of the Apparatus Committee: R. C. Denny, chairman; A. J. Hall, E. E. Valk, A. W. Coply, G. H. Bragg, H. L. Doolittle.

tem troubles, and from that standpoint alone their operation might well be justified. In fact, rarely do such small plants individually have any importance to a large generating and transmission system other than those just pointed out. Collectively, their output is of importance, as it is safe to say that every member company's system has use for every kilowatt-hour that can be produced at all economically.

The Southern California Edison Company has in service nine semi-automatic generating plants, totaling a capacity of 14,655 kw. in seventeen units, ranging in size from 250 to 3,000 hp., working under static heads of 305 to 1,150 feet. These are all old plants that have been changed over from manual control and having both impulse and reaction type turbine (the former predominating), direct connected to synchronous generators. The largest number of units in any one plant is three, these being of 250 hp. each. Few of these plants have any appreciable storage capacity at their fore-

to a plant closing down even for a short period, would come along later after the plant was again under load and increase the head in the irrigation ditches. This has had its effect on the plan of operation of these plants and the application of automatic features to gain the desired operation. Float control of the load is not used, the nozzles or deflectors being controlled from a third plant, where an operator is in attendance at all times. The flow through the plants may thus be

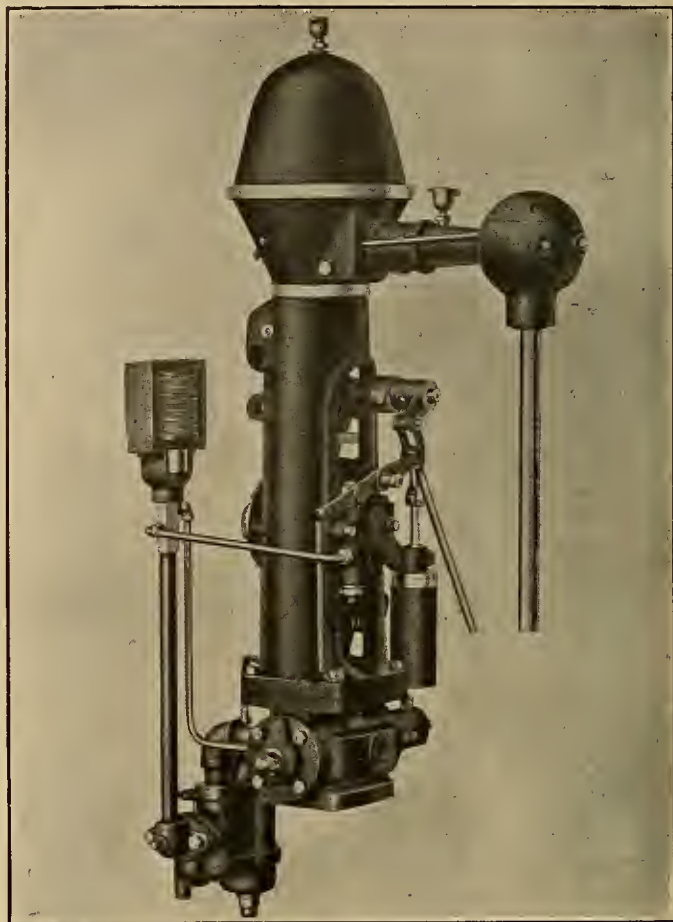


Direct current operated gate control to shut down induction generator in event of runaway. San Joaquin Light and Power Corporation.

bays, consequently their operations must conform to the amount of water flowing. This is accomplished by means of float control of the turbine gates or nozzles to vary the load to correspond with variations in flow.

The San Joaquin Light and Power Corporation is at present operating three semi-automatic generating plants, and within the near future will have two more in operation. The generating capacity of the five will total 8,775 kw. in five units, ranging in size from 475 to 5,000 hp., operating under static heads of 45 to 405 ft. Two of these plants were entirely new developments as semi-automatic plants and employ induction generators directly coupled to reaction type turbines, while the other three plants are being changed over from manual operation and employ synchronous type generators direct connected to reaction turbines. Four of these plants are operated in series effecting control of stored water, one of them making its load changes automatically by means of float control, while the load changes at the others are made manually at the dispatcher's orders. The fifth plant is entirely independent of any stored water, being a stream flow plant also employing float control.

The Ontario Power Company of Ontario, California, has two remotely controlled generating plants entirely automatic in their operation. These are of 500-kva. and 400-kva. capacity, operating under static heads of 310 ft. and 284 ft., respectively. The generating equipment comprises synchronous generators direct connected to impulse type turbines. Both plants were entirely new developments as automatic plants and in lieu of steam generation or purchased power. In their operation these plants affect the flow of water for irrigation purposes and consequently they must persist in uniform operation or interfere seriously with the irrigators. Obviously, water spilled into the natural channel at the head works, due



Automatic starting mechanism, solenoid operated, applied to control parts of Woodward Oil pressure water wheel governors.

maintained constant, regardless of whether or not the units are in operation.

The two plants just described are the nearest approach to the entirely automatic generating plant among the companies of the P. C. E. A., particularly one of them, which goes on the line automatically at synchronous speed and has its field energized. At all the other plants mentioned it is necessary for an attendant to actually be in the plant to synchronize the unit on the line, excepting, of course, the induction generator plants, where the units are simply brought up to synchronous speed and closed in on the line.

As to automatic features and operating circuits in the plants we find the similarity anticipated at the outset, although some very original and novel schemes have been employed in connection with float control of load, particularly those to prevent overtravel of the governor by means of intermittent contact-making devices in the governor control motor circuit. Where the plants are remotely controlled there is always some indication at the control station of the load, either directly by wattmeters or in terms of gate opening. In this connection one of the electrical manufacturers has developed a unique system of monitoring the operation of the automatic features in a plant by listening in over the telephone. By means of selector switches the operating condition of any particular device may be ascertained or all of

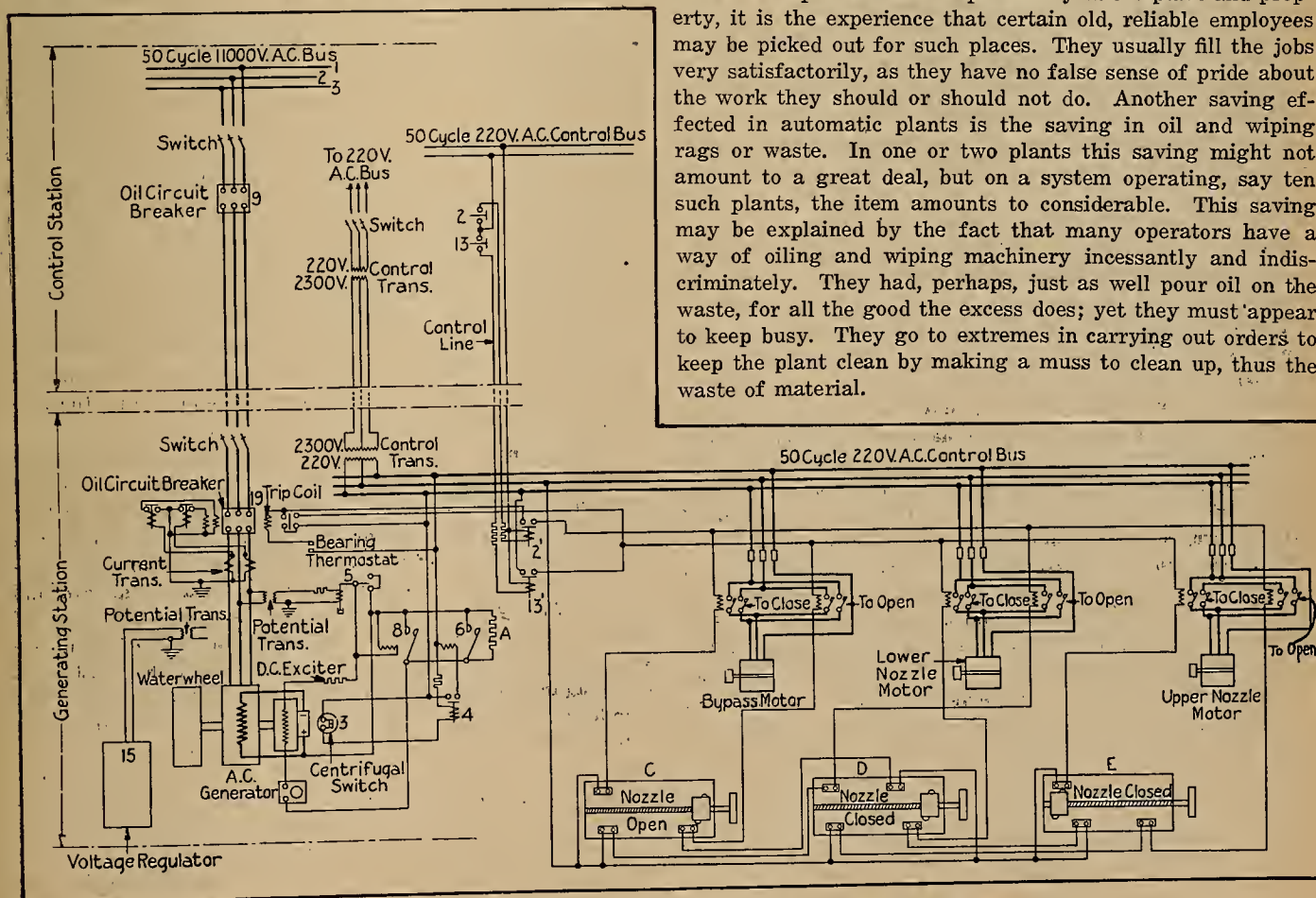
them in proper sequence. Needless to say, the indication is transmitted by means of a code rather than phonographically. One of the manufacturers of oil pressure governors has brought out a solenoid operated control valve which operates directly in connection with the governor and which may be actuated by float or remote control. In this connection, also, an automatic brake has been devised for holding the gates at any position and preventing them from drifting.

One feature common to all automatic generating plants is the overspeed device for preventing disastrous runaways. These are standard devices made by several electrical manufacturers and in which the operating principle is that of a lever displaced by centrifugal force in opposition to a spring. They function at a pre-determined per cent overspeed to either close or open a circuit, which through auxiliary relays causes the water to be shut off from the turbine. This is best accomplished by tripping the governor safety latch, which practice is followed in many of the plants. The real danger from runaway of synchronous generator units is that from high voltage, which may either break down the insulation or cause flashovers, resulting in destructive arcs or generator burnouts. Therefore, the high voltage cutout relay is common to most automatic synchronous generator plants. It functions at a predetermined over voltage to insert additional resistance in the exciter field circuit, which reduces the generator voltage to a safe value. These also are standard devices. They may be used in connection with an automatic voltage regulator if the plant be equipped with one and prove an additional safeguard.

In most all the automatic plants the bearings are equipped with thermostats or temperature relays, which function at a predetermined temperature rise to shut down this unit. These too are standard devices. Troubles either in the generator or on its cables, due to breakdown or in case of loss of excitation, are generally cleared by differentially

connected overload relays or by reverse power relays which function to trip the generator switch and then open the field switch. The plants are generally protected from line troubles by overload relays of the inverse or definite time relay types, usually the former. Governor oil pressure system troubles can, by means of pressure regulators, operate auxiliary relays to close the plant down or to signal an attendant, likewise in case governor belt failures which would in some cases overload the plant. In practically all plants changed over to automatic operation it has been necessary to apply numerous home-made or make-shift devices in the absence of standard devices. However, at the present time there are several of the large electrical manufacturers who are prepared to quote on completely equipped automatic generating plants in capacities up to 10,000 kva., which is quite a notable advance in the art.

Under actual benefits derived from automatic operation we may point out that many of the small plants discussed thus far are stream flow plants, or those affecting seasonal control of stored water, and as a result are subject to quite low load factor operation. In fact, two such plants of 425 and 1,000-kva. capacity have over a four years' period of operation averaged load factors of 60 per cent and 23 per cent, respectively. It is felt that they have done well to produce power at the same average rate per kilowatt-hour as the larger hydroelectric plants of the system. Obviously, their operation as manually controlled plants would result in prohibitive production costs. In other of the automatic plants operating at higher load factors, kilowatt-hour costs will be further reduced, even justifying in many cases one attendant where it is the desire to have a caretaker on the property. This brings up another point of advantage in semi-automatic operation, in that unskilled attendants may be used in such plants. Even though it is sometimes necessary to pay a man more to accept the whole responsibility of the plant and property, it is the experience that certain old, reliable employees may be picked out for such places. They usually fill the jobs very satisfactorily, as they have no false sense of pride about the work they should or should not do. Another saving effected in automatic plants is the saving in oil and wiping rags or waste. In one or two plants this saving might not amount to a great deal, but on a system operating, say ten such plants, the item amounts to considerable. This saving may be explained by the fact that many operators have a way of oiling and wiping machinery incessantly and indiscriminately. They had, perhaps, just as well pour oil on the waste, for all the good the excess does; yet they must appear to keep busy. They go to extremes in carrying out orders to keep the plant clean by making a muss to clean up, thus the waste of material.



Wiring diagram of remotely controlled generating station of Ontario Power Company.

It is a very difficult thing to say where the line should be drawn in regard to the size of generating plants to operate automatically or even semi-automatically. So many considerations enter into such a proposition that each development of the sort deserves its own particular study, and in every case a very careful study is the height of wisdom. The operating charges in any hydro plant, which are largely labor charges, may vary anywhere from one-half to one-fifteenth of the total kilowatt-hour costs. Such variations are governed largely by fixed charges and load factor operation. These things are, therefore, fully as important or more so than operating labor in considering new automatic plant installations, otherwise they may not turn out to be as economical as anticipated.

These very considerations would tend to indicate that the automatic plant must be based on much the same set-up as any plant. Also, since the labor saving in an automatic plant is practically the only saving, it is an important item only in smaller plants or in larger plants that are subjected to poor load factor operation, for in plants of large output and high load factor operation the labor charge per kilowatt-hour is insignificant. It is only too obvious then that while large plants may be made to operate automatically, there is little to be gained by it, as the plant investment is fully as great as for the other type plant, the automatic features possibly even offsetting the saving in operating labor.

Even though the size of automatic plants may be unlimited, so far as possibilities are concerned, there is a limit of practicability. This is rather governed by the importance of the particular plant to the entire system of which it is a part. It is obvious that any plant that represents in itself a large percentage of the system generating capacity, should not be tripping off the line for various minor and inconsequential things that might be remedied if there were an operator in attendance. Even in the case of line troubles or disturbances, the judgment of a good operator very often saves an interruption, where the automatic plant would in some cases be tripped off unnecessarily. From the standpoint of plant safety, too, there is much that can be said, particularly in regard to fires starting from minor arcs or oil explosions. In such cases the relay protection may function to save the generating apparatus, but it does not put out the fire. The presence of an operator with a fire extinguisher in such cases is indispensable.

While the committee cannot attempt to state the practicable size of automatic generating plants, it has been the endeavor to bring up and point out the various points of practical consideration as having the most bearing in the matter. We are unquestionably living in an age of stunts, so that it behooves engineers to exercise very sound judgment in any consideration of automatic features merely to replace the human element.

Standardization of Practices Recommended in Purchasing and Storing

By C. A. Kelley*

THE committee recommends that the wastefulness of the frequent and indiscriminate use of the "emergency purchase order" should be brought to the attention of everyone in our different organizations, to every employee of all the companies. In its proper use and place the "emergency purchase order" is of great advantage and will save both time and money, but the committee feels that often the emergencies are imaginary rather than real, and that articles are purchased in this way to satisfy a particular whim or notion of the purchaser, whereas a little thought would have led to securing the article in the regular and less expensive way or in substituting from the storeroom stock a similar article that would answer the purpose. Not the real, but the imaginary emergency purchase is the wasteful and extravagant one.

With the desire to expedite and facilitate company operations and construction and to cut down the cost thereof, the members of the committee were unanimous in their feeling that the importance of the purchasing department and the stores department should be stressed in all organizations. Often work is seriously hampered and delayed due to lack of material, which delay could have been avoided had the purchasing and stores departments been advised sufficiently in advance of the proposed needs. It was felt that if the representative of the departments could be apprised of or be present at the inception of the plans for proposed work, that often the final completion of that job would have been expedited by the departments having the material, if standard, on hand in sufficient quantities for the work, or if special, having the sources of supply investigated and, where possible, obtaining options on the best delivery of the material needed. The committee recommends that representatives of the purchasing

and stores departments be invited to attend the meetings of the engineering committee or other committees that might discuss and decide on matters pertaining to the standardization or the need of material and supplies. To be forewarned is to be forearmed, and the earliest possible information the purchasing and stores departments could have regarding proposed needs of the organization would make it that much easier for the departments to supply the demands when made, thus facilitating the work and cutting down the cost thereof.

The purchasing and stores departments do not wish to dictate standards, but rather to learn what those standards are; nor is it the intention of these departments when hearing of proposed extensions to purchase at once without authority the materials needed, but the departments wish to gain an early idea of the proposed possible needs and line up the material or the sources of supply.

The committee feels that a considerable saving can be made in the printing and stationery department by careful study of the sizes in which paper stock is furnished and by investigating what sizes this stock may be cut into by the fewest operations and the least waste. The committee recommends that the sizes thus determined be made standard and that all forms be printed on one of these standard sizes of paper. This would tend to standardize the size of filing envelopes, boxes and cases, thus cutting down the waste and extravagance of manufacturing so many different sizes. This standardization can be carried to the desks, tables and other articles of office furniture, as well as many of the articles carried in our materials and supplies. The committee commends the excellent work of some of the technical committees on standardization of line material and the like, and recommends that the different electric companies, as far as possible, standardize on these many articles used in line and

*Purchasing and Stores Committee: C. A. Kelley (chairman), F. W. Smith, C. E. Barschig Jr., C. R. Eccles, J. L. Gray, F. F. Henry, J. H. Hunt, D. P. Mason, W. J. McCullough, G. C. Robb, C. D. Weiss.

station construction as being the best way to avoid additional cost of multiple manufacture as well as being an excellent way of cutting down inventories and the cost of maintaining large supplies.

The committee recommends that all shippers be instructed to plainly mark packages with the purchase order number and the purchase requisition number. Likewise invoices, shipping bills and other papers in connection with the same should be marked with the order and requisition number. The committee feels that such marking is so important that all receivers should use their utmost endeavor to see that such instructions are complied with.

The committee recommends that whenever, in an organization, the standard affecting any article of supplies in the storeroom is changed or a new standard is adopted, that definite information relative to the change or adoption, approved by the proper and final authority in the matter, be forwarded to the purchasing and stores departments. At the same time definite instructions from the proper authority should also be forwarded to the stores department relative to the disposition of the material supplanted by this change of standard or adoption of a new one. The stores department should be definitely notified whether it is to junk and scrap the old material, move it elsewhere, use it for another purpose, or continue to issue it for its original purpose until entirely disposed of.

The committee recommends that all unapplied material in any organization should be in the custody of the stores department.

The committee recommends that each stores department should issue what would be known as "Stores Department Book of Rules." This book should be issued in some loose leaf form to facilitate additions and revisions and should set forth detailed information relative to the stores department forms and their use. Among other things, this book should give the names of the form as well as the purpose of the same, also how and by whom the form should be prepared, the number of copies to be made, the distribution of the several copies and the handling of the same by those receiving such copies.

The committee recommends that each stores department should issue in suitable loose leaf form a book to be known as "Standard Lists of Materials Carried in Stock." This book should contain a list of all such material, designating the article by the proper name according to the dealer's catalog, the proper description of the article and its use, and such other information as will enable the party desiring the same and the storekeeper handling the same to quickly and accurately identify and procure it.

Ordering

Under the above heading the committee recommends the following:

To facilitate reference and insure permanency, all purchases should be made upon written requisition only. Where emergency demands the purchase may be made upon oral request, but this should be followed immediately by the written requisition.

To insure legibility, as well as neatness, all forms used in requisitioning material should be typewritten.

Anyone authorized to order material, or, in other words, to prepare requisitions, should have the following information:

Correct description of the article wanted.
The correct quantity.
The correct charge.
The purpose for which to be used.
Correct consignee and shipping point.
Date upon which the material is needed.

This information should be accurately entered upon the requisition and the party making the same should then secure

the necessary approval and see that the requisition is placed in the hands of the purchasing agent without delay.

In ordering material for the replenishment of stock it is of the utmost importance that the party preparing a requisition know exactly:

The usual source of supply.
Quantity on hand.
Quantity on order.
The average monthly consumption of the article.

If it is a seasonable item, that fact must be taken into consideration and the quantity increased or decreased as conditions warrant.

Orders for stock should call for standard package quantities or multiples thereof. Orders for special items should call for the exact quantity desired.

The requisitioner should be supplied with a "List of Standard Materials Carried in Stock" and should requisition exactly according to the description therein.

Purchasing

The public gains its impression of a public service corporation through contact with its employees. This applies as truly to the purchasing department as to any other branch of the business.

The purchasing agent should have full charge of all purchasing, with, of course, the privilege of securing assistance from others of the organization where necessary.

All requests for prices should be made by the purchasing department. The purchasing department may delegate to representatives of different departments authority for selecting of material, but the actual purchasing should be done only on an approved purchase order through the purchasing department.

The organization of a purchasing department will depend upon the size of the corporation, but should be so organized as to facilitate operation, as delay in this department can be both costly and annoying. Where feasible, purchase of material should be segregated and assigned to different members, to make possible a better knowledge of the material and the sources of supply, and to avoid the possibility of different ones attempting to secure the same article at the same time.

Action by the purchasing department is called for by the receipt of the requisition.

These requisitions having first been checked as to correctness in details, should, where the organization permits, be distributed to the several buyers, who through their familiarity with certain lines, are often able to recognize the good buy at a glance, thereby saving time of obtaining quotations, facilitating quick delivery where needed, and likewise making it possible to take advantage of exceptional offers when presented.

The source of supply having been determined, the purchase order should be issued promptly, giving full details of the articles required and specific instructions as to shipment and delivery. Sufficient copies of this order should be made to properly notify all those interested in the purchase.

The committee suggests the adoption of a standard purchase order form, similar to the accompanying illustration. This form does not attempt to prescribe exactly what should be printed in detail thereon, but does prescribe that it should be printed on standard size paper which will cut without waste—namely, $8\frac{1}{2} \times 11$, or 5×8 —and that such information as each organization desires on the order shall be placed in the same relative position. The committee believes that such zoning of information and instruction would be of great benefit to dealers and will enable them more quickly and accurately to comply with the purchaser's order.

Acknowledgment of the order from the vendor should be insisted upon to assure the purchaser that the order has

been received and that the parties to the contract are mutually agreed upon all terms upon which the order is placed and accepted.

The responsibility for delivery of material to the shipping department should be placed upon the purchasing department. Purchase orders should be followed up to insure that vendors ship material on the date promised.

The committee suggests that all bills of lading or other shipping papers, as well as all invoices, go first to the purchasing department. This routine will inform the purchasing department that shipment either entirely or partially has been made, will avoid further necessity of following up the vendor and will give the required information for tracing the shipment, if necessary, with the carrier.

Many orders are shipped promptly, and these ordinary routine matters need not be particularly traced unless shipping department acknowledgment of receipt of the goods does not come through immediately after promised shipping date. In the purchasing department a follow-up system should be established that will automatically call for inquiry upon the vendor if the shipment has not been made at the expressed time, and insure the prompt following up of the vendor until the shipment has been made.

Prompt receipt of vendor's invoices should be insisted upon, and the same must be legible and specific, carrying the necessary details to avoid confusion and facilitate approval and payment. These invoices should be checked carefully as to price and calculation.

The committee recommends that a complete purchase and cost record of all orders be kept by the purchasing department.

These record sheets and cards should be of a standard size and should be indexed under the name of the article purchased. They should show the order number and date, the name of the vendor, the quantity purchased, cost and the unit price. Particular companies, according to their organization, location and the methods of business, may desire other details.

Routing instructions for shipment should be issued at the time the order is placed. If an organization has a proper traffic department the routing can well be taken care of by that department; otherwise the responsibility therefor should be upon the purchasing department.

Receiving and Checking

The receiving department should be furnished with a copy of the purchase order to identify and check the shipment. All packages and shipping papers should be plainly marked with the purchase order number and the purchase requisition number.

The receiving department should check all shipments and make a report thereof on a form suitable for the purposes of the organization.

Visual inspection, and where advisable, detail test should be made of all material received by the receiving department. Where deemed necessary the article should be passed for further test to the laboratory or other test department. Written reports of these tests on proper and suitable forms should always be made, signed and forwarded without delay to the party properly interested therein.

All goods should be opened and inspected for overages, shortages and damages. When any develop, the material should be held in the original container, railroad inspector called when necessary and proper papers executed. An "over," "short," "damaged" or "unsatisfactory" material report on a proper form should be made up, all available papers attached thereto and sent to the proper department as the claim may indicate.

The receiving department should receive all freight and express bills and approve the same for distribution of charges and payment.

The committee recommends that freight and express charges be paid by draft, accompanied by original freight bill or express receipt, rather than from petty cash.

Storing

The necessity for storing is to provide materials for immediate use. If market conditions were ideal, purchases would for the most part be made as goods were needed, the quantity of stores carried would be comparatively small, and the problem of storing would not be troublesome. But those conditions do not exist, due chiefly to:

Inability to obtain quick deliveries from local dealers.
Necessity of supplying materials for emergency repairs.
Great distance from source of supply.

The committee recommends the practice of sectionalizing stores stock for convenience of storage and issuance of material as follows:

- Sec. 1. Acids, cans, carboys, drums, greases, oils and paints, etc., motors, motor starters, panels, regulators, relays and transformers, except current, potential and street lighting.
 - Sec. 2. Meters, current, potential and street lighting transformers and telephones and parts.
 - Sec. 3. Electric material—general. Does not include wire, cable or miscellaneous repair parts.
 - Sec. 4. Hardware—line construction, miscellaneous pipe and fittings, shelf hardware, tools, etc.
 - Sec. 5. Bar and sheet brass, copper, iron and steel, insulating material, transformer bushings, magnet wire, miscellaneous repairs parts, etc.
 - Sec. 6. Cross-arms, guy covers, lumber, wood pins and poles.
 - Sec. 7. Cable, cord, wire and wire reels.
 - Sec. 8. Stationery, office supplies and fixtures and electrical appliances.
 - Sec. 9. Scrap and obsolete materials.
- After purchased material is receipted for by the receiving department, stockmen should take charge thereof and segregate according to the above classification.

Miscellaneous hardware, electrical supplies, stationery, packing, etc., should be placed on shelves in a careful manner and in alphabetical order, according to classes; the old stock in front and the new stock in rear. This saves deterioration in all stock. Not more than one package at a time should be opened.

Materials should be stored, insofar as conditions will permit, in such a manner as will require the least handling considering its movement both from the receiving department and to the shipping department, or to the department using the materials.

The store inventory should be taken by a separate inventory, card being made up for each item of stock. This card gives the section number in which the material is kept, description of material, amount on hand, received after count, issued after count, and unit price. This card should then be checked by a representative of the audit department and entered into the ledger or stock cards showing correct amount on hand and card number. All stock should be placed on the shelves in such a manner as to be convenient for inventorying without removing from the shelves.

A label should be placed on the front of the shelf, giving a full description of the material. This material should at all times be kept in this one particular place and in the condition outlined above. The descriptions on the labels should be the same as those in the stock ledgers or stock cards, which are correct according to "The Standard List of Material" and descriptions in dealers' catalogs.

In order to facilitate delivery of fast moving store materials, the committee recommends the adoption of standard package quantities of knobs, pins, insulators, lag screws, bolts, etc. These may be carried in packages or placed in bundles or boxes in quantities suitable for shipment to other store-

rooms or for issuance to shop or line crews, according to the nature of the article, use thereof and the demands or other details of the particular organization.

Disbursements and Returns

No disbursements should be made from any storeroom, except upon presentation of a written requisition on a proper form.

No material should be returned to any storeroom without written receipt being issued therefor on a proper form.

The accuracy of the records of material and supplies issued is of first importance, and stores department employees should give careful attention to disbursements with the view of getting the record of each item issued, where it went and the purpose for which it was used.

The committee recommends that all transfers of material between stores should be made on a form of standard size, so constructed and of sufficient copies to entirely complete the accounting for the transaction. Acting as a requisition on the general stores, a receipt for the goods, an invoice for the material transferred, where necessary a requisition on the purchasing department, and a shipping manifest. This recommendation is made to avoid rewriting the list of materials during the operation of completely supplying the requisitioning storekeeper, except in cases of the general store back-ordering; when a similar form of standard size of sufficient copies should be made up for the particular items back-ordered.

The committee recommends that all sales should be made through the sales department, and that no material be issued for sale from any storeroom except upon a written regular sales department order, made upon a form of standard size with sufficient copies to inform those interested and to insure that the transaction is properly carried out and accounted for.

Accounting

The committee believes that experience has shown that it is very difficult to get persons in the various organizations handling material and supplies, outside of those actually en-

gaged in accounting for the same, to realize the importance of properly accounting for materials and supplies. Storekeepers and their assistants can be of great help in this respect by fully realizing this responsibility and by impressing it upon the others in the organization through personal contact and solicitation.

The committee realizes that through differences in size, location and methods of operation of our different companies, standardization of forms is a difficult problem. The committee feels that for the present standardization of practices is of considerably more importance than standardization of forms, and except in a few instances have not and do not at this time wish to recommend standard forms, but prefer for the time to bring out the best practices in each organization, and where possible have them applied in all organizations. This, in time, will undoubtedly bring out some general style or classes of forms, but the committee feels that the doing or carrying out of a proper method or routine is of more importance than of a particular detailed way of performing that task.

In conclusion, the committee wishes to state that it feels the Pacific Coast Electrical Association has taken a forward step in the past year by organizing the Purchasing and Stores Committee, and the members individually wish to thank the officers of the association for their individual appointment to this committee, as the personal acquaintanceship and the interchange of ideas at our several meetings has already resulted in the adoption by many of us of some practice, method or idea which one or more of the other members of the committee had already put into successful operation. It was our first year, and some time was necessarily consumed in getting acquainted, organizing and working out details with which none of us were familiar. As stated, already this interchange of ideas has borne fruit, and we trust that our report, incomplete as it necessarily is, will be of benefit to us and our associates in our several organizations, and we recommend that the Purchasing and Stores Committee continue as an activity of the Pacific Coast Electrical Association.

| | |
|---|--|
| ZONE 2. Space of one inch is reserved for name, address, etc., of Buyer. | ZONE 1. Space is provided for necessary instructions of buyer and seller, in upper right hand corner, convenient for reference in loose file or binder. |
| ZONE 3. For name and address of Seller to whom Purchase Order is to be mailed | |
| ZONE 4 Is used for shipping instructions | |
| ZONE 5. Is devoted to general conditions of purchase | |
| ZONE 6. Is for listing materials ordered | |
| ZONE 7. For the signature of the Buyer | |

Standard Zone System Purchase Order Form

The Zone System will to all intents and purposes, serve as a Standard Purchase Order Form, in that each item of information will always be found in a definite place.
The upper part of Zones 1 and 2, may contain information not necessary for the seller but of value as a record for the buyer, and may be detachable by perforation on the original copy, and any other special

requirements necessitating more or less space on the form, can be accommodated, without affecting the zone arrangement.
The Zone System can be adapted to any size sheet, but two sizes, 8½ x 11 in. and 5 x 8 in., which are most generally used, are recommended as standard for the Zone System.
Note: Standard Zone System, Purchase Order Form adopted by N.A.P.A. at Rochester, N. Y., May 19, 1922.

Recent Developments of Alternating Current Substations

By R. C. Powell*

THE principal features of interest in the practice of a.c. substation construction and operation are the progress in outdoor design and application, and the development of automatic reclosing control. This report will, therefore, be devoted largely to these subjects.

Outdoor Substations

All necessary substation equipment can now be purchased for outdoor installation and excepting in the congested business areas of the larger cities it is now becoming standard practice to place a large part if not all of the equipment outdoors.

The question of how much to place outdoors is answered largely by the character of load supplied and the service requirements. For unattended stations it is the usual practice to make a straight outdoor installation, but if attendance is required the construction may be modified by placing lower

The desire for reduced cost of investment has been largely responsible for the introduction of the outdoor idea. While this has been realized for high voltage stations, for many low tension stations too much elaboration of the outdoor features has undoubtedly resulted in greater cost. Out-

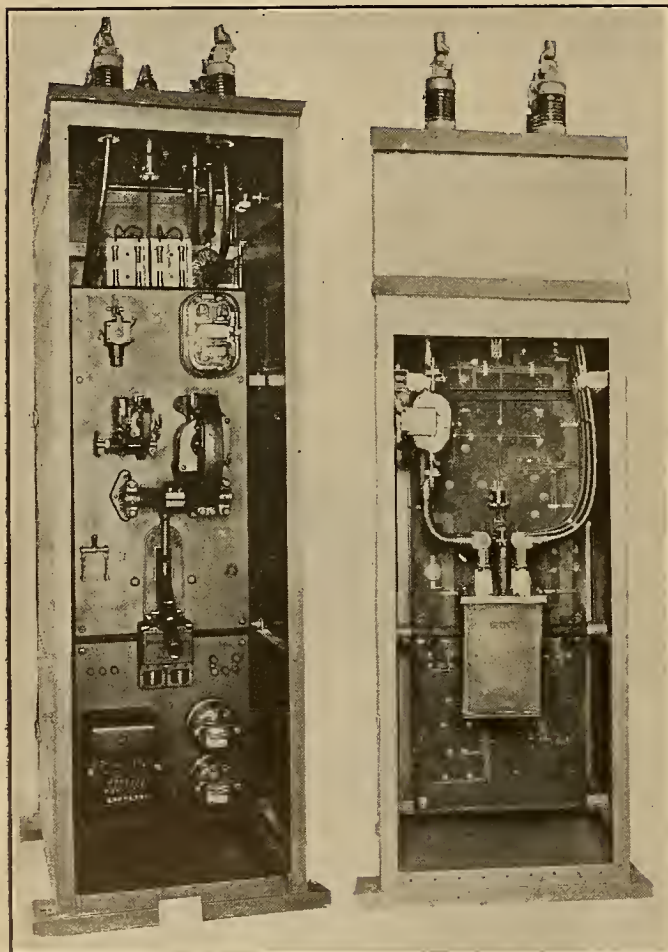


Fig. 1—Front view (left) and back view (right) of 4,000-2,300-volt, 3-phase, 4-wire type "G" switch house complete with periodic reclosing relays and clapper operated breaker.

voltage (2.4 and 4 kv.) switches, regulators, etc., indoors. In stations where rotating apparatus is operated the outdoor features may be modified still further by placing higher voltage, say 11-kv., buses, etc., indoors.

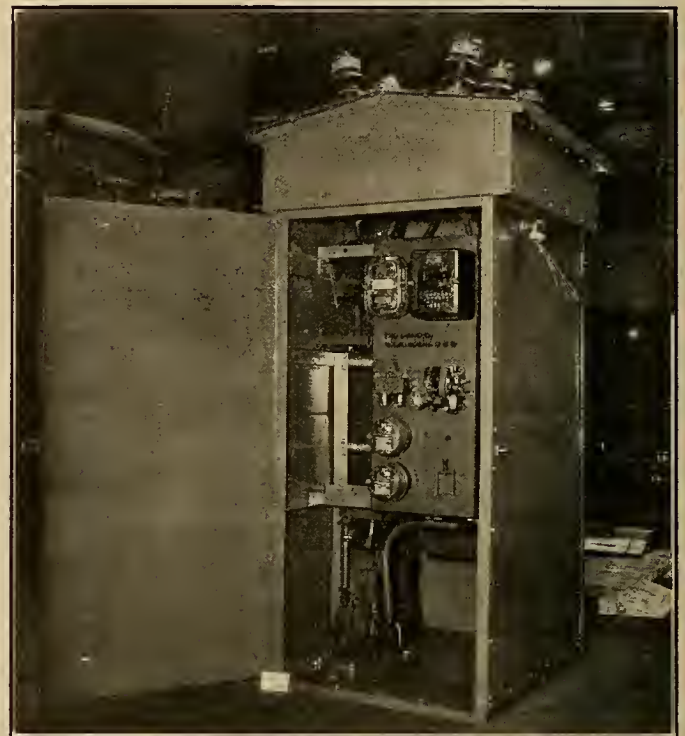


Fig. 2—Front view of 13,200-volt, 3-phase periodic reclosing switch house with type "B-2" breaker and a.c. solenoid mechanism.

door construction does, nevertheless, lead to one extremely desirable feature, namely, greater separation of conductors and the removal of oil filled apparatus from confined spaces. The failure of such apparatus with possible scattering of burning oil does not present the same liability for complete destruction of the station that indoor installation does.

Automatic Substations

In order to reduce operating costs without impairing service—indeed, in many cases it is the means of improving service—automatic control for the operation of a.c. substations has been developed. Although the idea followed naturally after the successful operation of d.c. automatic substations, the purposes are somewhat different. Both, of course, eliminate almost entirely the labor cost for attendance. For the d.c. station, however, the principal objective is to meet load requirements economically by automatically cutting in or out the necessary converting capacity; but for the a.c. station the principal objective is more economical protection to service. It has often been found in practice that a circuit breaker closed immediately after opening automatically upon overload will remain closed, that is, the cause of opening was a momentary overload such as the swinging together of conductors, or a short circuit which cleared when the circuit was opened and remained clear after the circuit was closed. This reclosing is done by automatic control and thus dispenses

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entirely with attendance for switches controlling circuits which are not involved in system switching operations.

Automatic reclosing control may be used to advantage under the following conditions.

- 1—To replace attendants.
- 2—To improve service at unattended substations.
- 3—To reduce attendance or improve operating conditions in large attended stations where the operator has a variety of apparatus to attend.
- 4—To improve service on rural lines covering a considerable area by installing automatic reclosing switches on branch lines where they tap the main line so that trouble on the branch may often be cleared without interrupting service.

There are a number of schedules upon which reclosing control devices are built to operate. These may be roughly divided into two classes: 1—those which reclose instantly or with definite time interval; and 2—those with selective action, time or load being the agencies affecting the selection.

A general description of the operation of the various schemes will be given more in detail.

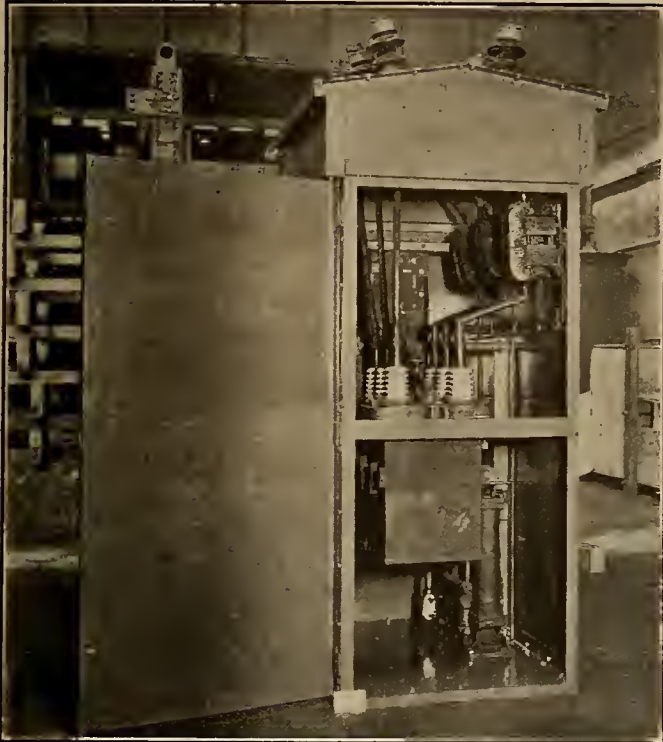


Fig. 3—Back view of Fig. 2.

Scheme 1.—This is the simplest. As soon as the breaker opens on overload it is closed immediately by the reclosing control. If the short circuit has not cleared this is repeated until the short circuit is cleared or the breaker has opened three times, whereupon it is automatically locked out and must be reset manually.

This scheme has two advantages: first, it places severe duty upon the circuit breakers; second, it may not in some cases give sufficient time between openings and closings of circuit to successfully clear short circuit.

Scheme 2.—Under this scheme the objections of Scheme 1 are met by the addition of a relay which controls the time interval of closing, that is, the breaker can close them only after a definite time interval, usually 30, 60 or 120 seconds, although this interval may, of course, be other values if desired.

According to the tentative recommendations of one manufacturer, the rating of a breaker is reduced to the values given in the following table:

| RATINGS OF OIL CIRCUIT BREAKERS WITH AUTOMATIC RECLOSING | | | | |
|--|-----------------------------------|-----------------------|-----------------|--|
| | No. Automatic Openings | Time Interval seconds | Per cent Rating | |
| 2 | Automatic Openings (2 shots)..... | 240 | 100 | |
| 3 | " " (3 shots)..... | 240 | 80 | |
| 3 | " " (3 shots)..... | 60 | 70 | |
| 3 | " " (3 shots)..... | 30 | 60 | |
| 4 | " " (4 shots)..... | 30 | 50 | |
| 3 | " " (3 shots)..... | 1-2/3 | 40 | |

Scheme 3.—Under this scheme, which is a combination of Schemes 1 and 2, the severity of the short circuit selects the sequence of operations. If an overload of less than 50 per cent of feeder short circuit current occurs Scheme I is put into operation and the breakers operate three times consecutively as quickly as possible, but if the overload exceeds 50 per cent then Scheme 2 is put into operation. This scheme has the advantage of keeping synchronous apparatus in step upon the occurrence of less than 50 per cent of feeder short circuit current, and reducing the duty of the breaker for cur-

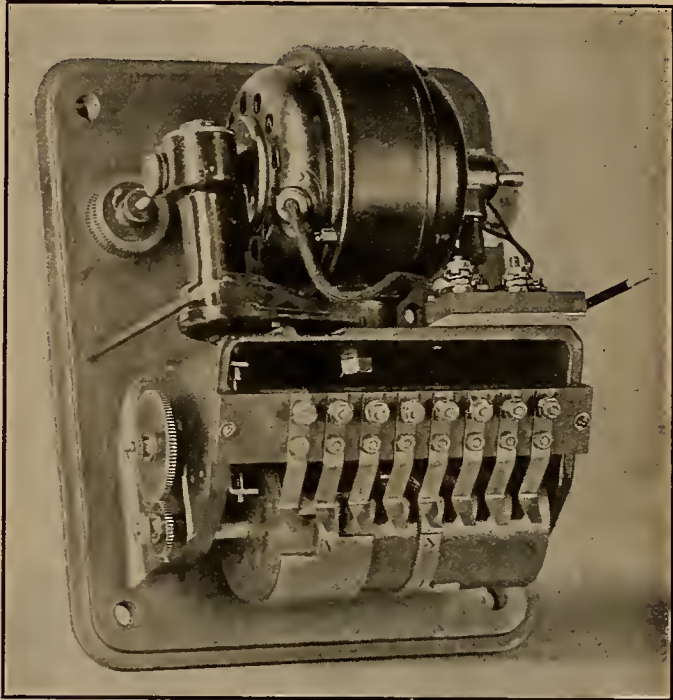


Fig. 4—Interior view of periodic reclosing motor relay. Arrow indicates extra timing gears.

rents exceeding 50 per cent. The time interval for the heavy short circuit condition is usually set for 240 seconds.

Other schemes may also be employed. For example, in a station with d.c. control circuits supplied from a battery of limited capacity there is a possibility that the battery may be ruined or that the breakers may not operate if a number of breakers open simultaneously. Hence, a relay is introduced so that only one breaker may operate at a time.

Oil Circuit Breakers

With the rapid growth of generating systems it is well to check up the capacities of oil circuit breakers, and it must not be forgotten that many of the breakers in service may be dangerously overloaded as regards rupturing capacity. In order to correct this, either reactors or breakers of higher rupturing capacity must be installed.

Induction regulators: The current which an induction feeder regulator will safely withstand in the event of a feeder short circuit is limited to 25 times rated amperes and a number of failures of regulators have occurred due to heavy short circuits.

In certain cases where induction regulators are in circuits supplied from transformer banks of very low impedance it may be necessary to install reactors.

Progress and Development of Overhead Transmission Systems

By J. A. Koontz*

THE past year has shown material growth and progress in the development of the overhead plants on the Pacific Slope. Undoubtedly the most noteworthy advance will be the placing in operation of the first 220,000-volt transmission system—that of the Southern California Edison Company. These Big Creek lines will undoubtedly be operating at 220 kv. before this report goes to press. The changes on the system are of special interest in showing the advance in transmission practice. The company has taken the 150,000-volt steel tower system, and with minor changes, adapted it for use at the higher voltage. In many cases the towers had to be raised to take care of adequate clearance caused by the necessary lengthening of the insulator strings to accomodate the higher voltage.

The insulators to be used consist of eleven of the standard 10-in. clevis type units in suspension with a shield ring 28 in. in outside diameter, which is supported concentrically with the lower unit. The top of the shield is 11 in. above the conductor, is made of aluminum and is an inverted "U" shape in cross-section.

The line being of the single circuit type, with wires in the horizontal plane, arcing horns are used on the two outside wires at the points of insulator attachment. These arcing horns have a spread of 27 in., while on the center wire a

26 in. diameter ring made of iron is attached at the tower end of the insulator. (See Fig. 1).

Dead-end insulation consists of two parallel strings of thirteen standard 10-in. units having an elliptical shield ring around the two units with single arcing horns on the tower end. Tie-down strings are composed of twelve standard 10-in. units with shield ring. This shield ring is slightly smaller than the suspension ring and is placed around the top unit next the line wire. (See Fig. 2.)

It must be borne in mind when considering this problem that the engineers were definitely limited by certain clearances which were originally designed for 150,000-volt operation, but on account of the liberal design it was possible to convert this system to the higher voltage at a relatively small cost compared to the cost of a new circuit.

The conductors, on account of aluminum having been used, had sufficient diameter, due to conductivity requirements, and by resort to the strategy of shielding, in order that the air at no place near the conductors or insulator support was stressed to the breakdown point, it is believed, even in the limited space available, that the Southern California Edison Company will get as reliable operation at the higher voltage as they have had when operating at 150,000 volts.

Poles

The pole situation in the West is becoming acute, in that the pole producers have not been able to keep up with the demand, it being very difficult to obtain seasoned poles at the present time. Practically all companies have standard-

*Overhead Systems Committee: J. A. Koontz (chairman), R. R. Cowles, P. O. Crawford, R. E. Cunningham, R. S. Daniels, E. N. D'Oyly, R. H. Halpenny, C. A. Heinze, W. A. Hillebrand, H. H. Henline, N. B. Hinson, J. P. Jollyman, L. M. Klauber, H. Michener, E. R. Northmore, E. Y. Porter, D. D. Smalley, E. A. Quinn, H. J. Ryan, T. W. Snell, P. M. Wentworth, R. J. C. Wood, C. E. Young, S. J. Lisberger.

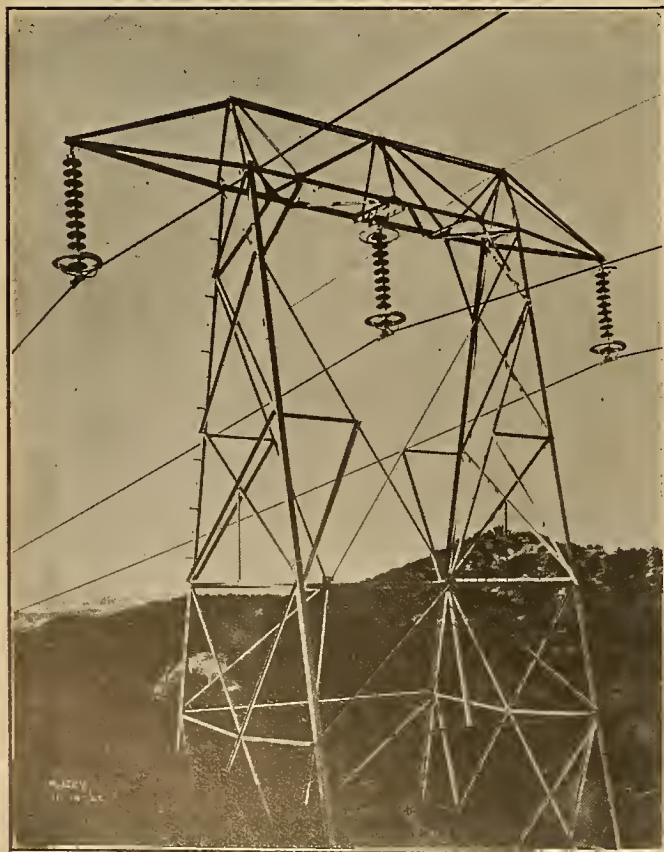


Fig. 1.—Aluminum shield rings on 220,000-volt lines of the Southern California Edison Company.

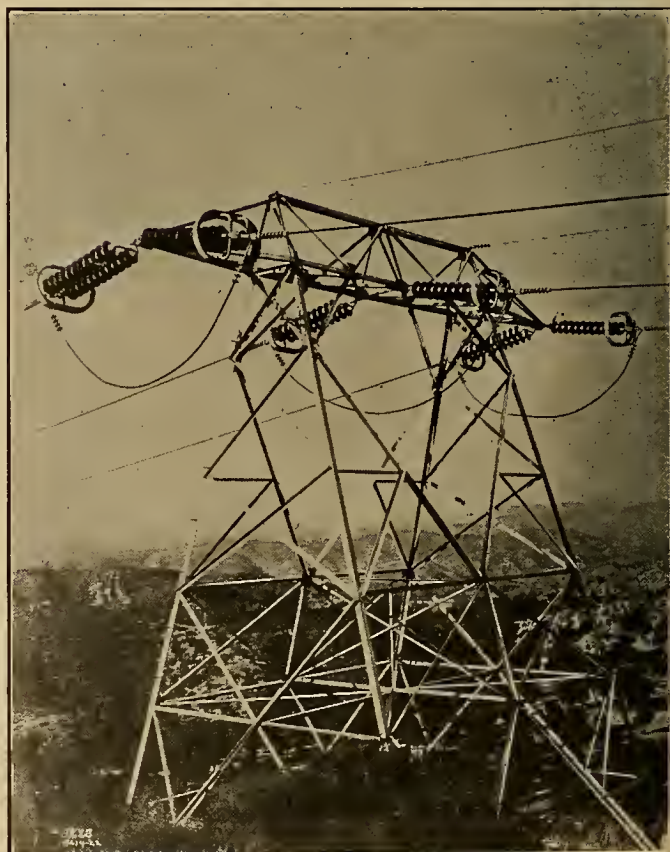


Fig. 2.—Aluminum high-tension suspension rings on the lines of the Southern California Edison Company.

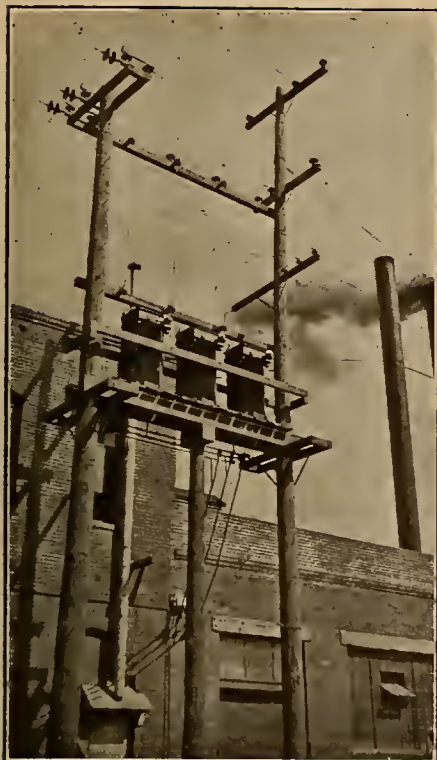


Fig. 3.—Fifty-five-foot joint pole installation of P. G. and E. and G. W. P. 11,000-volt lines. Three 75-kva. transformers with C. E. fuses.



Fig. 4.—Fifty-five-foot joint pole installation of P. G. and E. and G. W. P. secondaries. Fifteen thousand-volt transformer with C. E. fuses.



Fig. 5.—P. G. and E. 4-kv. primary, secondary and arc lamp. G. W. P. secondary, No. 3/0 copper, 18-in. spacing, 55-ft. joint pole.

ized on the creosote treatment, but are handicapped in getting poles sufficiently seasoned to get suitable creosote penetration. Some of the larger companies are even trying to anticipate their year's demands on poles of various classes and are purchasing their stock at least twelve months in advance in order that they may be certain of well-seasoned poles, and are building treating plants to do their own treating in order that they may be sure of the best results.

Termites have been giving some trouble in poles throughout central and southern California, and quite a study has been given to this matter. It appears that in general treated poles are not attacked by the ants to any extent, and that when they do work upon treated poles it is usually on poles which have season-cracked after treatment, and the ants are able to enter into these cracks and start in the wood below the penetration of the treatment. One company is considering the possibility of spraying the cracks in poles after same have been in service in order to try and eliminate these insects. The majority of the poles attacked are attacked near the ground line, or one to two ft. above, so that it would appear, in general, that the whole pole would not have to be sprayed, although occasional colonies of ants have been found in the upper portion of the pole.

Distribution Voltage

On account of the rapid development of this western district there have been numerous changes in distribution voltages during the past year on account of companies having to meet the rapid increase in load demands. The majority of these changes have been from 2,200 volts delta to 4,000 volts grounded star—in one case the change was made to 4,600 volts delta. There seems to be quite a growth also in 11,000-volt distribution, both 11,000 volts delta and 11,000 volts grounded star.

With the rapid growth in the use of electricity for domestic purposes, as well as in the manufacturing and industrial fields, the old distribution systems are becoming inadequate to handle the heavy loads which the public demands. It would seem that the time is rapidly approaching when

high voltage distribution systems will be essential. There are two or three factors in this question which will presumably be the determining factors as to what the ultimate distribution voltage in any particular case will be. These are:

1. Cost, including both construction and operation.
2. Reliability.
3. Grade of service required.

With the lower distributing voltages, due to street congestion on both overhead and underground systems, there is difficulty in getting the required space for ample circuits to handle the load. With the rapid growth of the heating load, voltage regulation is becoming more and more serious and primary regulation is more easily taken care of with the higher voltage.

Economy undoubtedly will force the public service companies to handle larger blocks of load from single feeders, but by better maintenance of the systems it is believed that the existing high-grade service can be maintained. Thus a portion of the distribution people feel that 11,000 to 13,000 volts distribution will, in general, be used in the larger cities or manufacturing districts before many years.

Because of the growth in loads and power systems it has been necessary to strength equipment along the line and tests have been made to develop high rupturing capacity fuses for transformers and line protection.

Considerable time has been spent during the past year in discussion and study of the new rulings of the California Railroad Commission and their application. Member companies throughout California feel that this work is a decided improvement over the National Safety Code for our local conditions.

At the time changes were being made relative to new orders the question of standardization was discussed, but it did not seem practicable to adopt any standards in connection with pole top construction at this time. However, one point should be borne in mind, and may possibly result in an ultimate saving—that is, the standardization of stock used for crossarm work. It is felt that there is a possibility of

standardizing on the size of timber used for various classes of crossarms, enabling the mills to carry large stocks for domestic use. The question of standardizing on the finished crossarm was not practicable.

Insulation

There have been no radical changes in insulation for a number of years. It has been a question of refinement of the product. The majority of insulator manufacturers are taking greater care in the handling of the elements which enter into their products; more care in the manufacture and assembly of the units; factory tests are becoming more rigid—so that the insulators installed on the lines today should give better service than those used in past years. The National Overhead Systems Committee has been making extreme temperature cycle tests on suspension insulators during the past year. Progress reports show that insulators of all types, as manufactured today, apparently are able to withstand temperature ranges of from 150° F. to 10° F. below zero, for several

hundred cycles without serious consequence. The only failures that have occurred from this test have been units of the bomb and link type from one manufacturer, while the same units from another manufacturer have not been affected. With this in mind it appears that units of any of the three standard types as now manufactured can withstand a great many temperature changes and wide temperature variation without serious consequence. This was not true in units of older design.

Power companies are including suspension insulator testing in their routine maintenance work, although none of the companies are testing pin-type insulators. The megger is in most general use, especially on the higher voltage lines, the western companies being rather backward in their adoption of hot line testing, or hot line maintenance work. About the only general hot line work done in this district is that of tapping in or cutting out transformers on so-called distribution lines of 30,000 volts and less.

Testing and Maintenance of Electric Meters

By W. H. Talbott*

THE success of short courses for metermen, held at several of the universities in the East, was discussed by this committee and it was decided that such a course should be held on the coast. Through the cooperation of Mr. Smith, of the Extension Division of the University of California, plans were made to hold a course at the university, May 14 to 19, inclusive.

Investigation has been carried on for several years,¹ relative to periodic testing of watt-hour meters, and the report this year must be considered as a progress report, as the committee feels that there are not enough records available upon which to make a decision as to the proper test period. The reports that have been received indicate that watt-hour meters which have been in service for a number of years, have tested within the range accepted as commercially correct.

Maintenance of switchboard instruments, meters, and relays, is a subject that is becoming increasingly important, and has been given more attention by the committee this year, than in the past. The following facts, with reference to existing practice, have been brought out:

1. That the meter department handles maintenance work done on switchboard instruments and meters, and that the relay work is handled by the department in about half of the companies. This work in other companies coming under the supervision of the operating department.
2. That there seems to be no general practice of a regular schedule for the checking of switchboard instruments, excepting those of the recording type which most companies check periodically or frequently. All other types are tested only when in need of repairs, or when doubt exists as to their accuracy.
3. That in general the "Overall" method of testing and setting relays is used.
4. That most companies use the same general type of apparatus for the testing of relays.
5. That it is the general practice for member companies to install bypass switches or test links on the secondaries of current transformers, to facilitate the maintenance of relays and instruments, these usually being installed on the switchboard.

The committee is of the opinion that it would be desirable to have developed, a convenient and practical method for checking relay connections, under the following conditions:

On many installations of reverse power relays, the current coils are fed from bushing type current transformers connected on a high voltage line while the potential coils are fed from potential transformers connected to the low voltage side of a transformer bank, this practice being used for the

purpose of saving the cost of high voltage potential transformers. But with no transformer on the high voltage side it often becomes difficult to determine the power factor and correct connections for the potential leads to the relays.

For relay testing, there are in use two portable telephone units. These are found to be very valuable where overall testing is done. By conversing over these telephones for instructions regarding loads, etc., a great amount of time and travel is saved.

A suitable single and double potential switch, for use with rotating standards, is a problem that has been given a large amount of attention by both manufacturing companies and the committee, and at the present time there are several that give promise of developing into a satisfactory switch that will meet with the requirement of the meter departments. The cooperation of the manufacturing companies has been appreciated by the committee.

Overall vs. secondary testing, has been a live subject for a number of years and while each company has its own method of making tests, it is the opinion of the committee, that overall testing is the most practical where conditions are such that a test of this kind can be made. However, there is a difference of opinion as to where the overall method should begin.

The efficiency in meter testing, on the Pacific Coast, presents a greater problem than in a more congested territory. The economical testing of rural meters offers the most difficulty. The wide use of electric power for irrigation makes it profitable to establish distribution networks covering wide areas, which means that an unusually large number of consumers in remote localities have service for electric lighting and heating, as well as for irrigation power. The efficient handling of a complaint test on a small lighting meter which may be anywhere from five to a hundred miles from meter department headquarters, is no small problem. Such a test must be made when called for, and made as promptly as possible. It will ordinarily be advisable to train power testers in the proper handling of lighting complaint tests. By combining such tests with power tests in the same neighborhood their cost may be materially reduced.

Testing in the larger cities presents fewer difficulties. Such questions as whether the men should report at headquarters in the morning or in the evening, or both morning and evening, and whether an automobile or the street cars

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should be used, are best settled according to local conditions. It is usually advisable to have each man handle a definite class of work, such as single-phase complaint testing, polyphase routine, direct current, etc., to improve his efficiency and save carrying different outfits. The location of meters in business districts has an important bearing on the efficiency of testing, and all the influence possible should be used to see that such meters are installed so as to permit a safe, quick test.

The situation regarding the use of Warren clocks has not materially changed since the submission of last year's report. A few interesting developments have been made during the year, however. One noteworthy installation is that of the Georgia Railway & Power Company, of Atlanta, Ga. Because of the far reaching effects of the installation of a clock on this system it offers an interesting example of the possibilities. The clock will control the frequency of approximately 50 per cent of the power used in the entire southeast. The Georgia Railway & Power Company is approximately in the center of the super-zone of the southeast and at present, the following 110,000-volt transmission systems are all operating in parallel:

Alabama Power Company
Tennessee Power Company
Georgia Railway & Power Company
Columbus Electric & Power Company
Central Georgia Power Company
Southern Power Company
Carolina Power & Light Company
Yadkin River Power Company.

With their power plant at Tullulah Falls, in the geographical center of this system, which extends from Selma, Ala., on the south, Nashville, Tenn., on the west, and Raleigh, N. C., on the north, the Georgia Railway & Power Company naturally has to assume a good deal of the responsibility in the smooth operation of the 1,200 or 1,500 miles of line involved. The Warren clock is installed in the load dispatcher's office and by means of it, very close regulation is being accomplished.

The proper size of watt-hour meters for various installations, covers a wide range and it was not possible to make a general investigation in the time available. Also, considerable work has been done in connection with the determining of proper size of meters for motor installations. Therefore, it was decided that this investigation should cover heating and cooking, as far as possible.

Good results were obtained by installing recording ammeters on a number of heating and cooking installations. As this was carried on during the winter months the results should show the maximum current required in each individual case. More work should be done along this line, before any definite recommendation can be made.

The protection of meters from the weather has been taken care of, in the last year or two, in a way satisfactory to those concerned. However, there should be made special mention of the cooperation that has been given by the owner, wiring contractor and box manufacturer. This, we are sure, has been accomplished through the efforts of the meter committee.

The manufacturers are doing all that is possible to make standard equipment, and to design their instruments so that they will meet the requirements of the power companies. The adoption of a removable terminal cover for meters should be accomplished in some way satisfactory to all. Another need felt by the committee, is the use of a standard thread on screws; this may be too expensive to accomplish. However, if it could be done, it would be a great help.

The measurement of kva. and power factor is important, as the utilities are lined up in favor of applying rates

which discriminate between loads of high and low power factor; but so far comparatively few central stations have adopted such rates, mainly on account of the lack of proper equipment to take care of the metering. The method of using a so-called "power factor clause" has not worked out satisfactorily, and there seems to be a well defined tendency or conviction that this problem is best solved by making the demand charge on the basis of kva. instead of kilowatt-hours.

In order to provide the necessary metering apparatus, most of the meter manufacturers have been making use of the polyphase watt-hour meter as the basic element. The Westinghouse Electric & Manufacturing Company is developing two different types of apparatus for the above purpose. One is the Sperti-Blecksmith type; the other, the Innes type. The first is made up of two standard polyphase kilowatt-hour meters; one operated as a kilowatt-hour meter and the other operated as a re-active kva.-hour meter. By means of two special registers similar to those in the Westinghouse RA meter, two arms are advanced, one by each meter, each arm carrying a lever. These two levers are tied together at one point. The linear advance of this connection pointer, transmitted through a flexible lead to the demand pointer, is a function of the kva. hours. Through a proper set-back, similar to the one in the RA meters, the kva. demand is recorded. The second, of the Innes type, consists also of two standard kilowatt-hour meters; one operated as a kilowatt-hour and the other as a re-active kva. meter. Through two small driving wheels of equal size the motion of each meter is transmitted to a sphere in such a manner, that if each would drive independently, it would turn the sphere in planes at right angles to each other. A third wheel of identically the same size as the driving wheels is driven by the sphere. This third wheel is at liberty to align itself in the plane of motion of the sphere. If the kilowatt-hour meter were the only moving element, for instance, at unity power factor loads, this third wheel would align itself automatically in the plane in which the sphere is driven by the kilowatt-hour meter, and if the re-active kva. meter were the only driving element, which would occur at zero power factor, this third wheel would automatically align itself in the plane in which the sphere is driven, which is at right angles to the plane in which the sphere is driven at unity power factor. It can readily be seen that, if both driving wheels are operating at different relative speeds, the sphere will revolve at planes which change the angle relative to each other according to the power factor of the load, and it can be shown mathematically that the third, or driven wheel, will revolve at a speed proportional to the kva. or integrate the kva. hours. By means of a standard demand attachment it is possible to derive the maximum kva. for any given period for which a demand attachment is designed.

The Sangamo Company is developing an equipment which consists, also, of two standard polyphase watt-hour meters; one connected as a kilowatt-hour and the other connected as a re-active kva. meter. A little synchronous motor of special design drives a strip paper chart horizontally. Another synchronous motor drives a stylus vertically across the paper chart. The kilowatt-hour meter controls the speed of the stylus and the re-active kva. hour meter the speed of the paper chart; the synchronous motor being provided only to supply the power and to set back the stylus every 15 or 30 minutes, according to the desired demand period. In actual operation, this meter will record on the paper strip vertical lines, the height of which are proportional to the kilowatt demand. The sloping lines connecting the base and top of adjacent vertical lines will be the average kva. The spacing between the vertical lines is a measure of the re-active component or re-active kva. of the power supplied. The cosine of the angle between the sloping lines and the

vertical lines is a measure of the power factor. The indication on a standard meter dial furnishes on one meter the kilowatt-hours and on the other the re-active kva. hours. From the record of such a meter it is possible to obtain all the different quantities involved in the measurement of electric energy.

The testing of large capacity meters presents conditions which are difficult to overcome. The principal source of error is stray fields. This can be eliminated to a certain extent by the arrangement of test leads, etc. Care should be taken when making an installation of this kind, as most of the trouble can be overcome by installing the meter in a proper location.

There seems to be quite a difference of opinion as to the use of oil in meter bearings. The tendency seems to be toward using oil very sparingly or not at all. The principal objections to the use of oil are:

1. Since meters are not entirely dust proof, dust and dirt will enter the meter and have a tendency to collect on the oiled surfaces, gumming up the oil and increasing the friction on the bearings.
2. Owing to the difficulty of obtaining experienced testers it is impossible to be sure of a uniform application of oil and there is danger that much harm may result.

The reasons advanced for the use of oil are:

1. The prevention of rust on steel bearings and gears. The iron oxide formed in the lower bearings of meters acts as a grinding agent and increases the wear on the jewel.
2. The oil floats the dust and oxide particles and prevents their reaching the bearing surfaces.

Most of the companies reporting use fish oils, the most popular being Ezra Kelly's and Nye's oils. Two of the manufacturers report that they are abandoning the use of fish oils, in favor of mineral oils, for the reason that animal oils are more likely to form acid. One company reports the use of Fulcrum Watch Oil, which is a bone oil.

Since the use of oil seems to be for the purpose of reducing oxidation, it is apparently advisable in applying the

oil that the film be as thin as possible. For that reason it should be applied, where possible, with an oil damped cloth rather than with a dropper. It is also well that a small piece of lead be carried in the bottle with the oil to neutralize any acid that may be present.

Several watchmakers were interviewed on the subject. It seems to be the unanimous opinion that the useful life of watch oil is from two to four years and that no oil can be relied upon after five years.

In view of the lack of information, we suggest that tests be made by member companies on the Pacific Coast, in order to obtain more information along this line. This could be made available to all companies, and would be helpful for future committee reports.

Through the cooperation of the meter and safety rules committees, several of the State Safety Rules have been modified, so that they are more acceptable to the power companies.

The committee suggests that the following subjects be continued in the next year's work:

Periodic Testing of Watt-hour Meters.

Maintenance of Switchboard Instruments, Meters and Relays; this subject to be divided into Maintenance of Switchboard Instruments and Meters, and Maintenance of Relays.

Potential Switch, for use with Rotating Standards.

The Proper Size of Watt-hour Meters, for various installations.

The Measurement of Kva. and Power Factor.

Use of Oil in Meter Bearings.

The committee was represented at the Milwaukee and New York meetings of the National Electric Light Association, Meter Committee. At New York the suggestion was made that the Pacific Coast have a larger representation on the National Committee. At that time it was thought advisable to recommend to the Association that the coast have more than one member.

An Analysis of Present Rate Schedules

By E. B. Criddle*

THE study of rate problems has been handled by various sub-committees with the members of the rate Research Committee as chairmen of the sub-committees, and is embraced in the following report:

Residence Lighting

Your committee in the study of suitable rates for residence lighting recommends as the most desirable for this class of business a kilowatt-hour rate suitably blocked so as to give the long hour user the benefit of the reduced cost.

As the number of small lighting consumers served by the average central station is much greater than any other class, it is essential to adopt a rate which is favorable from a public policy standpoint. The simple block rate is readily understood by the average customer, and although a rate can be designed for a given case which would approach nearer to the cost of serving a customer of this type whose load factor may vary over a long range, there would be a number of disadvantages to such a rate, the greater ones being as follows:

1. Lack of simplicity, and therefore undesirable from a public policy standpoint.
2. In order to give the high load factor customer the benefit of the lower cost of serving him, it is necessary to either measure, estimate or limit the maximum demand. The installation of a demand meter is not desirable because of the expense.
3. Demand limiting devices are expensive to install and keep in adjustment. Interruption of service when the customer exceeds his demand does not have a very favorable effect upon his attitude towards the utility.

4. Floor area, or the number-of-rooms-method of estimating the demand is not accurate and has the disadvantage of requiring entrance to the customer's premises.
5. Calculating the demand by the number of circuits or number of outlets, while fairly accurate, has the serious disadvantage of discouraging the use of electric service, in that some of the customers in order to keep their demand at a minimum would reduce the number of their outlets and thereby curtail the use of electric energy.

It is the belief of the committee that the top rates for lighting schedule should be similar in form throughout the different sections of the Pacific Coast, so that a customer being familiar with the rates in one section would find similar rates in any other section in which he might reside. With regard to rates for lighting customers in adjacent towns or districts served by the same utility, it is evident that unless there is a great difference in the cost of service, that the same rate schedules should apply. This policy tends to minimize the rivalry between towns and reduce agitation concerning rates.

Commercial Lighting

As outlined in the rate paper last year, generally speaking, "One rate for both commercial and domestic lighting service would be preferable for the reason that in a large number of cases where there is more than one rate applicable to this class of service, the kilowatt-hour use is such that it is very hard to determine just which rate would be the most beneficial for the consumer, and this tends to cause dissatisfaction among the consumers."

However, it would seem to your committee that there is one class of commercial lighting customer which is in an in-

*Rate Research Committee: E. B. Criddle, chairman; A. W. Childs, A. E. Holloway, P. W. House, M. E. Newlin, F. C. Piatt, W. M. Shepard.

dividual position—namely, the class consisting of the large office buildings, hotels and department stores—and especially in cases where steam is used for heating purposes and watch engineers are employed to tend the boilers and to take care of the buildings in general. In these cases your committee feels that from the "value of service" theory the rate offered must be attractive. Although a schedule suitably blocked might be designed which would take into consideration the lower cost of serving the large consumer, a wholesale rate with a high minimum is desirable for the following reasons:

- a—Although the average cost per kilowatt-hour may be the same under the wholesale rate as under the combination commercial and residence block rate, such a schedule for large users would appeal to a certain class of consumers who consider that their large consumption entitles them to special consideration.
- b—The large consumer generally has a higher load factor, a better diversity factor, and a lower percentage of peak responsibility than the residence consumer. Therefore, a better rate should be offered him from both the "cost of service" and "value of service" viewpoints.

Street and Highway Lighting

At the present time there is a very decided tendency toward more and better street lighting. This is probably due to two reasons: the unprecedented growth of this section of our country and the realization by business men that street and highway lighting is one of the community's greatest assets for more and better business. This being true, it is necessary to give very careful attention and much thought to rates covering this class of lighting, so that the cost will not prohibit and still be profitable.

A flat rate wherever practicable should be charged for all classes of street and highway lighting, whether they are systems owned and maintained by the lighting company, such as span and bracket type of fixtures, or ornamental electrolier systems owned by the municipalities or lighting districts. This rate should be so arrived at that all overhead charges, such as interest and depreciation, patrolling, repairs and any other charges incidental to the installation and maintenance of the system, shall be charged off to the burning hours between dusk and midnight, thus making the charge from midnight to dawn only an energy charge, which should encourage all-night lighting.

Wherever practicable, the rate for lighting should include maintenance of the ornamental standards, lamp renewals and globe renewals; in fact, everything necessary to keep the system in first-class condition, obsolescence, of course, being taken care of by the municipality or lighting district, as the case may be.

This not only lends to better care of the system, but also permits proper budgeting so that all costs are taken care of at least a year in advance.

Your committee would therefore recommend that in cases of lighting systems which the company owns, maintains and operates, that the rate should be a flat rate charge per lamp per month, based on the size of the unit, the number of units installed, the type of unit employed and the number of hours burning. This rate should be based upon a dusk to midnight schedule with an energy charge added for each hour the system operates after midnight. This rate is especially advantageous for the reason that municipal and country governing bodies must know the cost of operation of such systems before the system is in operation so that the proper amount of tax may be levied upon the property benefited. In cases where the systems are owned, maintained and operated by the municipalities or lighting districts, usually being of the electrolier type, the rates should be based upon the size of the unit and the hours of burning and should, wherever possible, be a flat rate. Your committee would recommend that wherever possible that the company make a rate in which it will maintain the systems, furnishing lamp renewals and keeping the posts in good order; with the exception, however, of the

underground system, which should be left to the municipality or lighting district to maintain.

Electric Signs, Flood and Billboard Lighting

Electric signs, flood and billboard lighting can all be grouped under one head, as in all of these cases energy is used principally for advertising purposes. Electric signs and billboard and flood lighting are oftentimes used at a considerable distance from the customer's place of business. It is the opinion of your committee that a flat rate schedule, optional with the regular meter rate, should be given, which would cover all this type of lighting, such schedule to be based upon the operation of this type of lighting from dusk until 12:00 p. m. each and every night. The flat rate given should be a flat charge per watt per month of connected load. Your committee's belief is that the rate after 12:00 p. m. should be considerably lower in most cases than that from dusk to 12:00 p. m. There are a number of reasons why this should be offered upon a flat rate basis, some of these being:

1. The advertiser must usually know the cost of service to his sign or billboard in terms of dollars per month before he is willing to enter into a contract.
2. By placing this service on a flat rate basis, the service can be given in the cheapest possible manner, in that it is not necessary for the company to read or install meters.
3. By placing this on a flat rate basis the company may place in connection therewith a patrol charge, and as the electric signs, flood or billboard lighting are usually a considerable distance from the customer's place of business, this patrol charge may take care of his turning on and off.

Your committee also would recommend that a service charge be made in connection with this flat charge, such charge to take care of the cost of maintaining and renewing burned out lamps.

Domestic and Commercial Cooking and Heating

Generally speaking, the power companies are approaching a period in growth when the expansion of business beyond the rate of normal community growth means the development of new fields, and as such the cooking and heating business is attracting considerable attention. As a consequence, no little consideration has been directed towards the subject of suitable rates for this class of business. Any discussion of rates, however, first involves some study of the comparative value and ultimate possibility of the cooking and heating load.

Such a study is aided by the comparison of the domestic cooking and water heating combination load with the domestic lighting load. The statistical figures for the year 1921 and 1922, as compiled by the committee, show that the average domestic lighting consumer uses about 28 kw.-hr. per month, while the average cooking and water heating consumer uses about 310 kw.-hr. or 11.1 times the consumption of the domestic lighting consumer. Separate domestic installations of electric ranges and electric water heaters average monthly consumptions of 151 and 230 kw.-hr., respectively, or 5.4 and 8.2 times the consumption of the domestic lighting consumer. Obviously, almost every domestic lighting consumer is a possible cooking and water heating prospect. Therefore, the ultimate possibility of this particular phase of the load becomes more apparent when the ratio of 11.1 is applied to the domestic lighting load of a power company. The approximate result may be here illustrated by assuming that the domestic lighting load of a power company is, say, 2 per cent of its total load, in which case the ratio of 11.1 would mean a possible increase of 22.2 per cent of its total load.

But residence or home heating, in addition to being insufficiently developed to provide representative statistics, assumes the difficulties of a variable and seasonal load. It becomes more difficult, therefore, to estimate the future possibilities of home heating, which likewise is true in a measure of commercial cooking and heating. It is logical to assume,

however, that these loads, from the standpoint of consumption, are of no less importance than the domestic cooking and water heating load.

From the power companies' standpoint the four principal factors entering into the question of cost of service of domestic cooking and heating are: the size of load, necessary investment, load factor and peaks. The first and second might be termed uniform, the third variable, and the fourth favorable. That is to say, the size of load is uniform in that the variations between the smallest and the largest installations are not so great as to necessitate rate differentials or to cause material variations in the necessary investment in services, while the load factors of installations are variable to about the same extent that domestic lighting is variable. The cooking and heating load is generally considered an off-peak load. It becomes apparent, therefore, that the most suitable form of rate for this class of service is the simple block schedule type of rate with sufficient minimum and differential to take care of the usual variations in consumption—a modified form of the schedule which is now quite generally in effect in central California. Simplicity of rate is popular with the consumer because it is easy to understand; it is advantageous to the power company because its application is easily explained.

A commission decision permits a more general application of the general power schedule to the commercial cooking and heating business. This should stimulate the use of electricity for that purpose, especially among consumers with a high load factor, and a connected load of 25 kw. or more. As this schedule is optional with the domestic cooking and heating schedule, the latter will prove more advantageous to the small consumer, but for loads of 25 kw. or more the general power schedule will run much lower than the commercial cooking and heating schedule, the reduction depending, of course, upon the size of load and the load factor. It would appear, therefore, that the general tendency is toward rates that will lead to a more rapid growth in load and at the same time produce satisfactory return for the power companies.

Rates for Industrial Power and Heating, Electro-Chemical Load and Electric Furnaces.

The above classes of load may all be characterized as heavy power service, involving bulk delivery of large blocks of power at a few locations, rather than small deliveries to a great number of consumers scattered over a distribution network.

Industrial power loads operate on a great variety of load factors; the power factor of delivery may range from 50 per cent to unity, and the usage is chiefly confined to the hours from 7 a. m. to 6 p. m., although certain industries may operate all night.

Industrial heating loads will tend to operate on a high load factor to obviate the losses incident to the cooling down of ovens, etc., while the power factor of delivery is likely to be close to unity. Electro-chemical industries are still more likely to operate at high load factor and power factor. Electric furnaces, for steel melting chiefly, are, on the contrary, liable to have very poor power factor, particularly early in the heat, as well as heavy momentary demands.

Under these circumstances, the fundamental rate question which arises is as to the relative desirability of separate rate schedules for these various classes of load, as compared with a single schedule, with proper adjustments, to cover all these loads.

Considered from the cost of service standpoint, it at once becomes apparent that no logical reason exists for a multiplication of schedules, for it is certainly self-evident that the cost of serving an industrial power load would be exactly the same as the cost of serving an electro-chemical load, pro-

vided the two loads had similar characteristics. If the characteristics were different, the single schedule would still be appropriate if the variation in charges under the schedule kept pace with the variation in cost, due to the change of characteristic.

The load characteristics involving differences in cost, and which would have to be covered by rate differentials in any schedule to satisfactorily cover the classes of load mentioned, are as follows:

1. Size of load: the larger loads are cheaper to supply, per unit, than the smaller.
2. Load factor: loads having high load factor being entitled to a lower rate.
3. Power factor: loads having high power factor being entitled to a lower rate.
4. Voltage: ownership of transformers by the consumer would entitle him to a rate differential.
5. Time of principal demand: loads which habitually keep off the peak being entitled to a consideration.

The ordinary "demand and energy" form of power schedule takes care of the variations due to size of load and load factor. The schedule may be of either of the two general forms illustrated in Appendices A and B, it being possible to make these forms practically identical in resultant charge, over the ordinary range of load factor.

Power factor requires special treatment, as it has not been generally covered by rates up to the present time. Various types of power factor rates have been proposed and used by different companies, including the use of kva. demand instead of kw. demand; the correction of the demand to a certain standard power factor as .80; special meters recording the kw.-hr. at normal rate, and, adding the reactive-component kva. hours at a reduced rate, and many other variations. After much study one of the larger companies of the state prepared and submitted as a proposal to the Railroad Commission in connection with a recent rate case the form of power factor schedule shown in Appendix C.

The general idea of this schedule is to reward good power factor and penalize poor power factor, leaving the regular rates unaffected for a range of normal power factor. The power factor on which the schedule charges are based is practically the average during the consumer's operations. The schedule is a rider to apply as a correction to regular power schedules and affects only those large consumers where correction of power factor by the consumer is economically feasible.

The question of voltage of delivery, which really means ownership of transformers, can readily be handled by a differential in the rate, and this is now incorporated in various schedules in use by many of the companies so that it represents nothing new.

The remaining question of a differential for off-peak loads has not been so extensively recognized. The off-peak period of most companies is between the lighting peak of the evening and the resumption of the industrial load in the next morning—for example, between 11 p. m. and 6 a. m. It may be desirable to make some discount in the demand charge for the power used within this period. One possible method would be to discount by a fixed percentage the entire charge on energy used within this period, but as this would involve duplicate metering equipment, together with time switches to transfer the load between the meters, it becomes complicated and hence undesirable. Another alternative is to discount the demand occurring off peak, either to ignore it entirely or to take only partial account of it. The latter is the method suggested in the rate schedule forms shown in Appendices A and B. This method requires the use of either curve drawing demand meters or a time switch to cut out the demand meter over the off-peak period, and should therefore only apply in cases of large consumption.

It thus appears that it is quite feasible to handle all the factors affecting cost of service to industrial power and heating, electro-chemical load and electric furnaces, by means of a single schedule applicable to all, though such a schedule will be somewhat complicated. The complication is not believed to be serious for the large loads considered, for in most of these cases trained engineers are employed by the consumers, and the explanation of the schedule becomes possible.

If applied to very small loads the complications of adjustment for all the various conditions becomes intolerable, and only differentials for size of load and load factor should be recognized in the rate.

A careful inspection of the alternative schedules shown in Appendices A and B, together with the power factor rider of Appendix C, will show that all the conditions laid down in the discussion have been compiled within these rates. The power factor rider, though shown separately, could of course be incorporated into either rate A or B, so that a single schedule would cover all the classes of service mentioned.

The alternative to a single basic rate with adjustment factors to cover conditions is a multiplicity of schedules, one for each class of service. These rates would then have to be hedged about with conditions to avoid abuse. It appears that the reduction in number of schedules and the policy advantage of uniformity of treatment of consumers would amply justify the use of the single schedule.

So far the discussion has been confined to the study of rate forms based on the cost of service theory. It may, at times, be necessary to recognize the effect of possible competition with isolated plants on the consumer's premises, either Diesel engine or steam engine. The rate forms suggested are elastic enough to permit adjustment for these conditions, their form corresponding in general to the shape of the cost curves existing with the private plants.

The granting of reduced rates during the development period of an industry is sometimes urged. This is quite hazardous, as the industry is not established on a firm basis, and is also likely to consider that it has a vested right in the reduced rate.

Rates for Industrial Power and Heating, Electro-Chemical Load, and Electric Furnaces.

Form of Schedule—"Appendix A"

(This schedule is quoted for form only and is not intended to be exact as to rates.)

Applicable only to alternating current electrical energy supplied at not less than 2,200 volts.

Rate (A)—

Service at 2,200 volts up to and including 25,000 volts.

Demand Charge:

First 250 kw. or less of maximum demand — \$500 per month.
Next 250 kw. of maximum demand—\$1.25 per kw. per month.
All over 500 kw. of maximum demand—\$1.00 per kw. per month.

Energy Charge (to be added to the Demand Charge):

First 150 kw.-hr. per kw. per month @ .9c per kw.-hr.
Next 250 kw.-hr. per kw. per month @ .8c per kw.-hr.
All over 400 kw.-hr per kw. per month @ .75c per kw.-hr.
Provided that in all cases at least the first 100,000 kw.-hr. of energy shall be charged at the .9c rate.

Rate B—

Service at company's standard transmission line voltages in excess of 25,000 volts.

The rate is the same as that set forth under Rate (A) above, except the demand charge shall be decreased 10 per cent.

Special Conditions:

- The maximum demand in any month shall be the average kilowatt input in the 15-minute interval in which the consumption of electricity is greater than in any other 15-minute interval in the month. For rapidly fluctuating loads, the company may base the consumer's maximum demand upon a 3-minute instead of a 15-minute interval.
- No demand occurring any night within the period from 11 p.m. to 6 a.m. will be considered in determining the demand charge; provided, that in no case shall the demand be taken as less than 25 per cent of the connected load, under this rule.
- Discount or penalty for power factor shall be as provided in rider.

Rates for Industrial Power and Heating, Electro-Chemical Load, and Electric Furnaces

"Appendix B"—Alternative Form of Schedule

(This schedule is quoted for form only and is not intended to be exact as to rates.)

Applicable only to alternating current electrical energy supplied at standard voltages, in accordance with company rules, from 110 volts to 2,200 volts.

| Connected Load or Demand | Rate per kw.-hr. for monthly consumptions of | | | |
|--------------------------|--|-------------------------|-------------------------|------------------------------|
| | 1st 60 kw.-hr. per hp. | Next 60 kw.-hr. per hp. | Next 60 kw.-hr. per hp. | All over 180 kw.-hr. per hp. |
| 2- 9 hp. | 4.0c | 2.1c | 1.3c | 1.2c |
| 10- 24 " | 3.6c | 2.0c | 1.3c | 1.1c |
| 25- 49 " | 3.1c | 2.0c | 1.3c | 1.0c |
| 50- 99 " | 2.6c | 1.7c | 1.2c | 1.0c |
| 100- 249 " | 2.2c | 1.5c | 1.1c | .9c |
| 250- 499 " | 2.1c | 1.3c | 1.0c | .9c |
| 500- 999 " | 2.0c | 1.2c | 1.0c | .8c |
| 1,000-2,499 " | 1.9c | 1.1c | .9c | .8c |
| 2,500 and over | 1.8c | 1.0c | .9c | .8c |

Minimum Charge—

Connected Load Basis: \$1.00 per month per hp. connected for the first 50 hp., plus \$0.60 per month for each hp. in excess of 50, but not less than \$2.00 per month.

Maximum Demand Basis: \$1.00 per month per hp. of measured maximum demand, which shall not be less than 20 per cent of the connected load, and in no case less than \$50.00 per month.

Special Conditions—

- Consumers having a total connected load in excess of 50 hp. may, upon request, have the rate and minimum based on maximum demand instead of connected load.
- The maximum demand in any month shall be the average kilowatt input in the 15-minute interval in which the consumption of electricity is greater than in any other 15-minute interval in the month. For rapidly fluctuating loads, the company may base the consumer's maximum demand upon a 3-minute instead of a 15-minute interval.
- For loads exceeding 300 hp. connected, and operating on the demand rate of this schedule, the following shall apply:
No demands occurring any night within the period from 11 p.m. to 6 a.m. will be considered in determining the demand charge; provided, that in no case shall the demand be taken as less than 25 per cent of the connected load, under this rule.
- Discount or penalty for power factor shall be as provided in rider.
Note: Discount for consumer ownership of transformers, if desired, could be applied in some such form as a discount from the monthly bill of \$0.10 per hp. of connected load for the first 200 hp., plus \$0.05 per hp. for all over 200. This should be limited to the larger loads, if included at all.

Rates for Industrial Power and Heating, Electro-Chemical Load, and Electric Furnaces

"Appendix C"

Non-optional Power Factor Rider, to be attached to regular schedules.

Power Factor Discount and Penalty—

Applicable to all alternating current power service supplied under standard schedules of the company, where the connected load exceeds 500 hp. Territory—

Applicable to all territory served.

Power Factor Determination—

The average power factor, weighted in proportion to consumption, shall be determined monthly by means of "Reactive Component Kilovolt-Ampere-hour Meters" used in connection with the usual kilowatt-hour meters; by means of two single-phase kilowatt-hour meters for measurement of 3-wire, 3-phase power load; or by such other suitable means as the company may determine.

Power factor corrective apparatus when used by the consumer, shall be so installed that it is effective only at times when the consumer's power load is in use; and discount shall be made for power factor correction during only those periods when the consumer's power factor is between .85 lagging and .95 leading, same to be determined by the company by appropriate tests. No discount or penalty under this schedule shall be applied for months when the kilowatt-hour consumption is less than 10 per cent of the maximum kilowatt-hour monthly consumption recorded for the load within the preceding 12 months.

Based on the average power factor determined as above, discounts or penalties, applied to the monthly total bill including minimums, shall be charged in accordance with the following rate table:

| Rate: | Discount or Penalty on Monthly Bill Percent of Total Bill | | |
|-----------------------------|---|--|--|
| | Discount or Penalty | For that part of bill up to \$2.00 per (a) hp. of Maximum Demand per Month | For that part of bill exceeding \$2.00 per (a) hp. of Maximum Demand per Month |
| Average Power Factor | | | |
| Above .97 to 1.00 | Discount | 2.50% | 1.25% |
| " .94 but not exceeding .97 | " | 2.00% | 1.00% |
| " .91 " " " .94 | " | 1.50% | .75% |
| " .88 " " " .91 | " | 1.00% | .50% |
| " .85 " " " .88 | " | .50% | .25% |
| " .70 " " " .85 | " | None | None |
| " .65 " " " .70 | Penalty | 1.00% | .50% |
| " .60 " " " .65 | " | 2.00% | 1.00% |
| " .55 " " " .60 | " | 3.00% | 1.50% |
| " .50 " " " .55 | " | 4.00% | 2.00% |
| .50 and less | " | 5.00% | 2.50% |

(a) For schedules not requiring maximum demand measurement, 75 per cent of the connected load shall be used.

Annual Minimum—

Where an annual minimum charge is involved, the discount or penalty applicable to said minimum shall be based on the above table using the average power factor, weighted in proportion to consumption for the entire year.

Oil Field Service

This service generally implies the actual service to oil leases for the purpose of operating equipment used for drilling and pumping oil wells, operating and gathering pumps, leased line pumps, and dehydrating plants, in connection with the production of oil.

In contemplating a suitable rate for the application to this class of business, it is well to remember that in many cases natural gas is available in sufficient quantities to present strong competition from the standpoint of economical operation, and as this is generally considered a byproduct in the production of oil, the tendency on the part of the producer is to assume that such fuel may be considered as having no bearing on the operating cost.

Fortunately, the general character of use of electric power in the oil fields is such as to produce a fairly high load factor, and consequently, lends itself more readily than other classes of power to the application of a straight kilowatt-hour charge. This type of rate being the most simple in form and application, might be said to be the most suitable form of rate in oil field service.

While, as stated before, the oil field load factor is fairly good, the power factor is notoriously poor, being generally between 40 per cent and 60 per cent, and this phase must be taken into consideration also in determining the rate to be applied.

As a low power factor not only affects service, in poor regulation, causing variable voltage and unsatisfactory power service, but also means increased cost to the central station company in operating costs and fixed charges on additional investment, it can be readily seen that measures should be taken to in so far as possible correct this condition.

In bringing the power factor to near unity, as stated before, certain corrective measures must be taken, and while the consumer must necessarily pay directly or indirectly the cost of obtaining this result, it would appear that in the case of general use of power for oil field service it would be more practical for the central station company to bear the burden in correcting this condition.

In considering the possibility of the consumer being required to install apparatus which would not operate lower than a given power factor, it must be taken into consideration that the character of use generally made of this class of service requires the installation of motors of such size and type which would not permit the use of synchronous in substitution for inductive motors. In general, the motors are of a relatively smaller rated capacity than is obtainable in synchronous motors, as the highest rating on the average pumping motors is not to exceed 30 to 40 hp.

The fact that synchronous motors are not obtainable in sizes less than 40 hp. and that the cost of such an installation would be increased approximately 100 per cent over that of induction type, would apparently make this substitution out of the question.

Considering the fact that oil field business is in a manner localized and also that where such a large number of motors of relatively small capacity are in operation, the diversity factor would be pronounced, it would appear that the central station can assume the burden of correcting low power factor much more economically than can the individual consumer.

The methods employed by central station companies in accomplishing this result are so well known that no discussion is necessary.

Obviously, the cost of correcting this condition is definitely reflected in the rate chargeable to this class of service, but by paying indirectly in this manner, the cost to the consumer is not only much less but more equitably divided than would be the case should each consumer be required to bear the burden of such corrective measures individually.

Agricultural Power Service

By agricultural power service is generally implied service to motors used for the irrigation of lands, silage or feed cutters, machine or blacksmith shops on the farm (where no commercial business is done), milking machines, cream separators, pumping motors for domestic water supply, and any other utilization of energy applied in connection with the farming business. In California and particularly in the San Joaquin and other central valleys, the principal use of power in the farming industry is for the purpose of irrigation, and necessarily this class of service is the determining factor in making a rate applicable to general use of power service in agriculture.

In the evolution of rate making it is probable that with the exception of lighting service, there have been more changes in rates applicable to agricultural power, than in any other class of service. This is, no doubt, due to the fact that the use of electricity in agriculture is of comparatively recent date, and as there was no precedent established as a guide to rate engineers, up to very recent years, the rates employed have been largely experimental.

It must be taken into consideration that the character of use is as applied to agriculture so diversified, that no set formula can be applied which will result in a rate that would be equally advantageous under all conditions. It must be assumed that seasonal use of power, crops produced, soil and general climatic conditions are all factors in determining a rate which would be applicable with any degree of fairness as between consumers operating under different conditions and whose power requirements are widely divergent.

One of the early types of schedule was the flat seasonal rate. As these were based on high load factor conditions that were largely presumptive, and in many instances could not be attained, it was somewhat impractical in general use and was not readily conducive to the wide distribution of power service.

As an entirely opposite type of schedule in its effect would be the straight kilowatt-hour charge. On account of the large diversity of use as mentioned before, this type of rate is conceded as being impracticable for general utilization. As where in the case of the seasonal flat rate, the consumer whose use is more nearly continuous might be unduly favored, with the resultant effect of discouraging the business offered by the consumer whose use might be for shorter periods or intermittent in character.

The straight kilowatt-hour charge, on the other hand, has the directly opposite effect of penalizing the consumer whose use would be more nearly continuous, and favoring the more unprofitable short term or intermittent business. Therefore, with these phases in mind, it would appear that a proper schedule or one which more nearly approaches the situation would be a schedule, which while keeping a degree of uniformity in charges for service, more nearly maintains a relation between the individual use made of the service by the consumer and the cost of service to the central station. It is generally conceded that this result is more nearly approached in the application of an annual kilowatt-hour rate, properly blocked as to kilowatt-hours, and the charges for same, so that a more equal relation between the various uses made of the service may be maintained. Such rate may be in the form of an annual demand charge to which is added a relatively low kilowatt-hour charge, the demand charge to be divided into equal parts and made payable over a period which would be most comparable to the seasonal use of the service.

An optional method of obtaining approximately parallel results is the application of relatively higher rates to the kilowatt-hour blocks, with an annual cumulative charge.

These two methods are illustrated by the following schedules which are being applied on the system of one California utility and are comparable to schedules for this class of service on other utility systems:

| Rate: | For Connected Loads of | | |
|---|------------------------|---------------------|-----------------------|
| | 2 hp. to 9 hp. | 10 hp. to 24 hp. | 25 hp. to and Over |
| Demand Charge per hp. per year.... | \$14.00 | \$13.00 | \$12.00 |
| Plus following Energy Charge per hp. per year: | | | |
| First 2,000 kw-hr..... | @ 1.7c | 1.6c | 1.4c |
| Next 2,000 " | @ 1.4c | 1.4c | 1.2c |
| Over 4,000 " | @ 1.2c | 1.2c | 1.1c |

| Rate: | Rate per kw-hr. for Connected Loads of | | |
|----------------------------|--|---------------------|--------------------|
| | 2 hp. to 9 hp. | 10 hp. to 24 hp. | 25 hp. and Over |
| Annual Consumption per hp. | | | |
| First 500 kw-hr..... | 3.6c | 3.4c | 3.2c |
| Next 500 " | 2.6c | 2.4c | 2.0c |
| Next 1,000 " | 1.7c | 1.6c | 1.4c |
| Next 2,000 " | 1.4c | 1.4c | 1.2c |
| All over 4,000 " | 1.2c | 1.2c | 1.1c |

MINIMUM CHARGE:
First 10 hp. @ \$15.00 per hp. per year, but not less than \$30.00 per year.
Over 10 hp. @ \$12.00 per hp. per year, but not less than \$30.00 per year.

The arguments which have been put forth in opposition to this form of rate are seemingly more or less superficial and are largely based on the consumer's inability to readily understand basic principles involved. As the average consumer is not acquainted with the principles of rate making, any change in form might present such an argument, and it would seem that these objections could be overcome by proper education and salesmanship.

While this discussion is based largely on personal experience and observation, it would appear to be a reasonable presumption that the form of schedules suggested would at least be an approach to the desired result.

Service to Municipalities

Electric service to municipalities by central station companies is of two classes, namely, retail service and wholesale service.

The first of these, or retail service, is the most general, and covers service to public buildings, both light and power, the lighting of streets, roads and parks, power for the operation of city water works, and sewerage systems. In short, it covers all that service required by a municipality for municipal purposes, this power being distributed and delivered to the point of use by the central station company.

The second classification, or wholesale service, covers generally the supplying of power in bulk or wholesale delivery to the municipality, for distribution by the latter to its citizens and for its municipal uses.

Retail service to municipalities is ordinarily more desirable than wholesale service, inasmuch as the distribution of electricity to the ultimate user is the proper function of the central station, and is a work it is eminently fitted to perform. In retailing to municipalities, service should be furnished on the same basis as to other consumers receiving like service. Street and road lighting presents a special class of business peculiar to municipalities, and should of course be so treated. This may be handled either by furnishing the electric energy only or by furnishing the complete service, including the installation of the system in part or in whole, the maintenance and operation of same and the making of lamp renewals.

It is believed that in general the most satisfactory arrangement is for the central station to furnish the complete service and to charge therefor certain definite flat rates, these rates to cover the electric energy supplied, the maintenance, operation and depreciation of the lighting system and a reasonable return upon the capital invested by the central station in the lighting system.

In some instances, where ornamental posts or other special features are desired, it may work out better for the municipality to own and maintain such parts of the system.

One of the principal advantages in having the complete service rendered by the central station is that it has within its control, all the facilities for rendering a complete service and that neither its revenues or reputation can suffer from the failure of the municipality to furnish that part of the service for which the municipality is responsible, as may be the case where the central station is not furnishing the complete service. The matter of rates for this service is discussed elsewhere in this report.

In considering the wholesaling of power to municipalities for distribution and resale by the latter to its citizens for general lighting and power uses, the matter of rates is of highest importance, not only with reference to a proper charge for the service rendered, but also in regard to the rates at which such power can be resold by the municipality. This service should generally pay a higher rate than the regular power schedule inasmuch as it is a load representing a composite of a large number of individual loads and so has taken advantage of the diversity which would ordinarily fall to the central station. In other words, it would ordinarily have less diversity with other loads than the general power loads for which the regular schedules are made and consequently should pay a higher rate. Again, the effect of this rate upon the retail rates to be charged by the municipality should be given consideration.

The retail rates of central stations are nearly always uniform as between communities and usually in rural territory as well. It is of course obvious that the cost of distribution varies as between these different communities and also in rural territory, being higher in the rural territory and in the communities having more scattered load conditions. It is also obvious that a favorably situated municipality can distribute power within its boundaries at less than the average cost and if power is sold to it at wholesale at or below the average wholesale cost, it can retail it at less than the retail price of the central station, which brings about an unfair comparison and unfavorable comment. The central station could do the same thing if it were permitted to charge higher rates to those communities or districts where the distribution costs were higher, but it is not permitted, nor is it desirable to do so, and in the interest of sound public policy it is believed that this is a good arrangement.

In the interest of fairness, however, the wholesale rate to municipalities would in some measure reflect this condition so that those consumers located in favorably situated communities supplied by municipal distribution systems should bear the same relative burden in helping keep down rates in less favorably situated localities as similarly situated consumers supplied by the central stations are required to do.

Competitive Installations

The report of last year's committee, covering cost of various forms of power, seemed to outline particularly plants of larger size or higher load factor than are generally encountered in the majority of cases where central station energy enters into competition with steam plants of from 1,500 to 5,000-kw. capacity, but in such cases the prospective consumer usually has at least a fairly accurate knowledge of the actual cost of operation, and except in cases where the fuel is a byproduct, and the cost of disposing of this byproduct also enters into the equation, it is usually quite apparent that hydroelectric central station energy is cheaper than other forms of power. This can be readily seen by reference to the "average cost per kw-hr." as shown in comparisons made in the 1921 report of the committee.

Generally speaking, the greatest advancement will be made in the central station field by extending the service to the greatest number of consumers and industries, and this means a more active campaign in the fields covered by small

units of 50 hp. and under used in agricultural sections, and plants in industrial territory where single unit installations of 400 hp. and under may be replaced by individual motor drive or group drive.

The committee's report for 1921 covers steam and Diesel oil engine installations of 1,500 to 5,000 kw., Diesel oil engines of 250 kw., semi-Diesel oil engines of 50 and 100 hp., and a natural gas engine of 45 hp. This covers practically all types of plants entering into competition with Pacific Coast central station companies except the small steam plants of approximately 400 hp. or less that are sometimes operated by irrigation companies and in industrial territory. To make the list of types more complete, tables are hereto appended, outlining the cost of operation of a 400-hp. steam installation using a Corliss compound engine operating condensing 18 hours per day at full load for 6 months per season, standing idle for the balance of the year. This class of plant will be found in agricultural fields. This sheet also covers a plant of the same size and type, but operating non-condensing for 8 hours per day and 300 days per year. This class of installation will be found in industrial territory.

It must be remembered that comparative costs as outlined on paper are not representative of actual average conditions as found in the field except in the case of the more reliable types of steam plants that are in use under high load factor conditions, and even in these cases physical depreciation only is considered in setting up the costs of operation on paper, while in actual practice functional depreciation almost always causes replacement many years before physical depreciation has ended the useful life of the unit. This is particularly true on the Pacific Coast where development has been so rapid.

Except in instances where the installation is of sufficient size and the yearly load factor is high enough to justify the employment of competent engineers to operate the plant, the cost of operation of a gas engine as set up on paper is misleading and entirely unreliable.

The cost of fuel is only a small portion of the total cost of operating an oil or gas engine, and the engine manufacturer and the prospective consumer who has not had previous experience with gas engines, will not accept the rates of depreciation, cost of repairs and cost of attendance that we all know are found in practice, when these items are set up on paper.

The man who has had years of experience in operating a gas engine as a side line to raising a crop, readily appreciates the value of electric service and it should be remembered that when we are selling electric service we are offering an entirely different service than the engine salesman is offering.

A favorite "outdoor sport" of the engine salesman is to offer to replace a consumer's motor with a gas engine and allow the consumer to pay for the engine with the "saving in cost of operation." What he really means is the difference between the fuel bill and the bill for electric energy. In such case the customer should secure from the engine salesman a written guaranty of the saving to be effected after proper allowance for maintenance, depreciation, interest and labor.

When the agricultural consumer is passing through a period of low markets for his product, this often sounds very alluring, but this is what results:

The seasonal hours of operation of the average plant in the agricultural district are such that the difference between the fuel bill and the bill for electrical energy will not pay for the engine in less than five or six years, and this means that the consumer will be paying the same amount in money per month for his power during this five or six year period as he paid under electric operation, the only difference being that part of the money goes to the party supplying the

fuel and the balance to the engine salesman. In addition to this, the consumer has the cost of repairs and annoyance of operating the engine for six years, if it lasts that long, and then finds his motor gone and a worn-out gas engine on his hands.

A number of years ago one of the large utility companies of the Pacific Coast replaced practically all of the gas engines under its lines and at that time, distillate was six cents per gallon and electrical energy was sold for approximately two cents per kilowatt-hour.

It has been found that the thermal efficiency of gas engines as actually tested in the agricultural districts of the Pacific Coast averages between 17 per cent and 18 per cent, and the cost of fuel per indicated horsepower was about \$.006. With natural gas of 1,100 B.t.u. per cu. ft. and at a rate of 45c. per thousand cu. ft., the cost per indicated horsepower would be approximately \$.0053.

From the above, it is apparent that the cost of natural gas in California at this time is little less than the equivalent of distillate at six cents per gallon, and the average rate per kw-hr. earned by agricultural consumers is less than two cents per kw-hr., so it should not be difficult to compete with natural gas engine drive if the salesman can make the prospective consumer see the actual facts regarding gas engine operation. These cases are matters of salesmanship rather than engineering.

The question of small gas engines for driving machinery in industrial plants need not be considered, as such matters as fire hazard, lack of flexibility, loss of production, loss of labor, etc., are so well known by the managers of industrial plants that such drives are seldom given a thought.

POWER COSTS, SMALL STEAM PLANTS

Case I.

A 400-hp. Compound Corliss Engine, operating and condensing at full load for 18 hours per day for six months in the year, and idle for the balance of the year. Engine direct connected to 300-kw., 2,200-volt, 3-phase generator.

| | |
|--|-------------|
| Cost of plant complete, including boilers, engine, generator, etc., \$190.00 per kw..... | \$75,000.00 |
| Fixed charges on plant, @ 15%..... | 8,550.00 |
| Kw-hr. generated annually, 972,000..... | |
| Fixed charges per kw-hr..... | \$.0088 |
| Fuel cost per kw-hr. with oil @ \$1.25 per barrel..... | .0106 |
| Labor cost per kw-hr..... | .0031 |
| Repairs, supplies, etc., per kw-hr..... | .0031 |
| Total cost per kw-hr. generated..... | \$.0256 |

Case II.

| | |
|--|-------------|
| A 400-hp. Compound Corliss Engine, operating non-condensing at full load for 8 hours per day, 300 days per year, direct connected to 300-kw., 2,200-volt, 3-phase generator, | |
| Cost of plant complete, including boilers, engine, generator, etc., \$175.00 per kw..... | \$52,500.00 |
| Fixed charges on plant, @ 15%..... | 7,875.00 |
| Kw-hr. generated annually, 720,000..... | |
| Fixed charges per kw-hr..... | \$.0109 |
| Fuel cost per kw-hr. with oil @ \$1.25 bbl..... | .0114 |
| Labor cost per kw-hr..... | .0050 |
| Repairs, supplies, etc., per kw-hr..... | .0042 |
| Total cost per kw-hr. generated..... | \$.0315 |

SECURING PLANS FOR ELECTRIC HOMES IN JAPAN

A campaign designed to increase the use of electricity in Japan is being waged in that country at present. The power companies there, both privately owned and those operated by municipalities, are cooperating with electrical manufacturers in an effort to educate the people to the use of new labor-saving devices.

As a means of securing interest in the drive, a contest is being held to secure designs for homes in which electricity can play the most important part in the most efficient manner, in the home of moderate means. These designs when submitted are in reality plans for electric homes. The winning plan will undoubtedly be given considerable publicity throughout Japan and will serve to give the residents of the island country a better idea as to how electricity may be utilized in their homes.

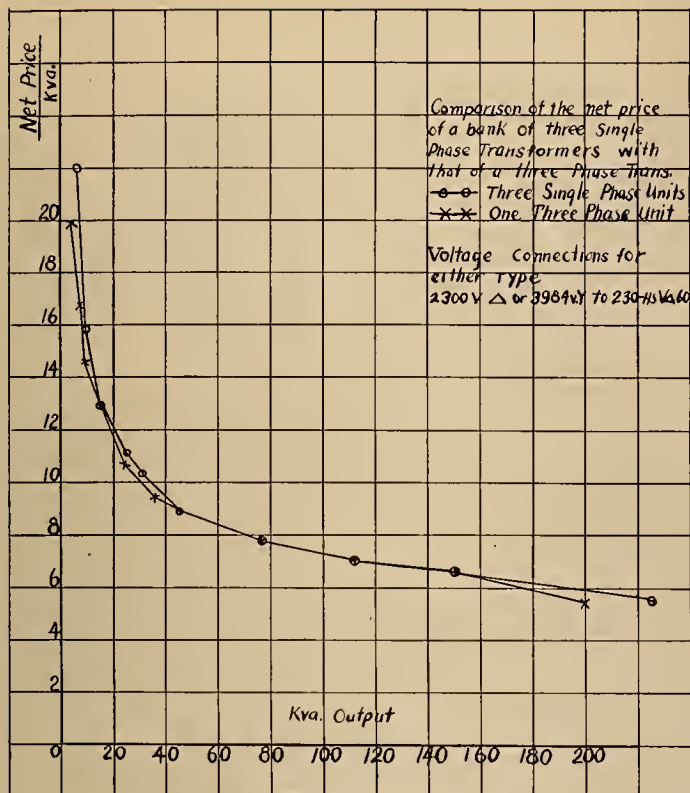


Fig. 1.—Comparison of net price, 2,300-volt type

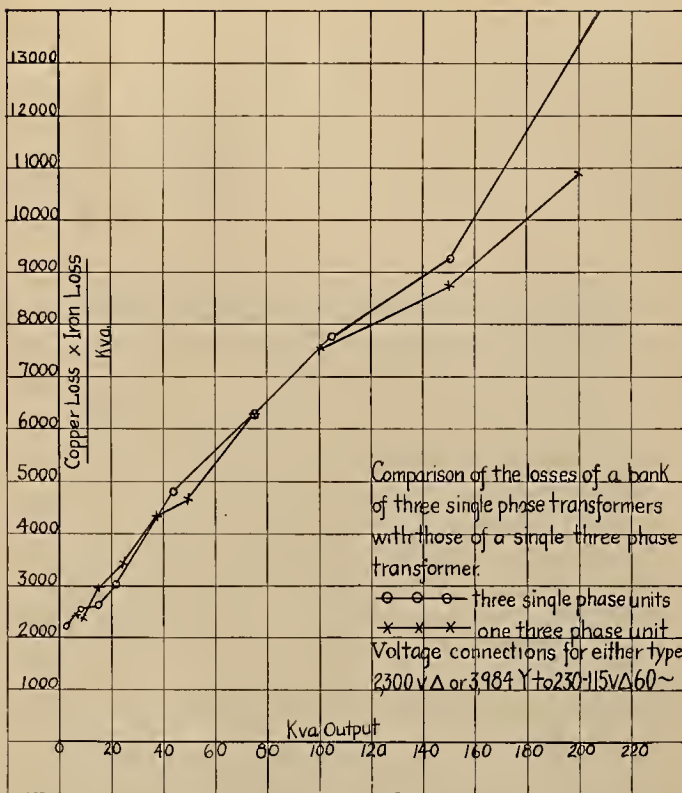


Fig. 2.—Comparison of losses, 2,300-volt type.

Three-Phase Vs. Single Phase Transformers for Distribution Power Service

By E. Y. Porter*

THIS subject has been very fully discussed in written communications addressed to the chairman of the sub-committee, as well as in oral discussion at each of the meetings of the apparatus committee. It appears that there is still a considerable difference of opinion among engineers, although the tendency seems to be in favor of 3-phase transformers for strictly power work. The San Diego Consolidated Gas & Electric Company, Southern California Edison Company and The Southern Sierras Power Company are definitely committed to the policy of using 3-phase transformers for distribution power service on lines of 11,000 to 33,000 volts, in sizes up to 300 kva., and The Southern Sierras Power Company is using 3-phase transformers on 2,300-volt circuits, in addition to higher voltage circuits. The San Joaquin Light & Power Corporation are definitely opposed to the use of 3-phase transformers, preferring the use of three single-phase transformers in each bank, frequently installing one transformer of larger size to take care of heating and lighting loads in conjunction with power service. The Pacific Gas & Electric Company has made only a very limited use of 3-phase transformers and prefer generally the use of single-phase, although they appear to look more favorably on the use of 3-phase under certain conditions. The Bureau of Power and Light of the City of Los Angeles has not used 3-phase transformers for power distribution, inasmuch as its service is nearly all within urban districts.

One of the important features of this class of service brought out in the discussion is the increasing importance of electric lighting and heating service in conjunction with power service in the rural districts, it appearing that in many in-

stances, particularly in the San Joaquin Valley, this domestic service amounts to from 50 per cent to 100 per cent of the power load. This fact, coupled with the fact that the service

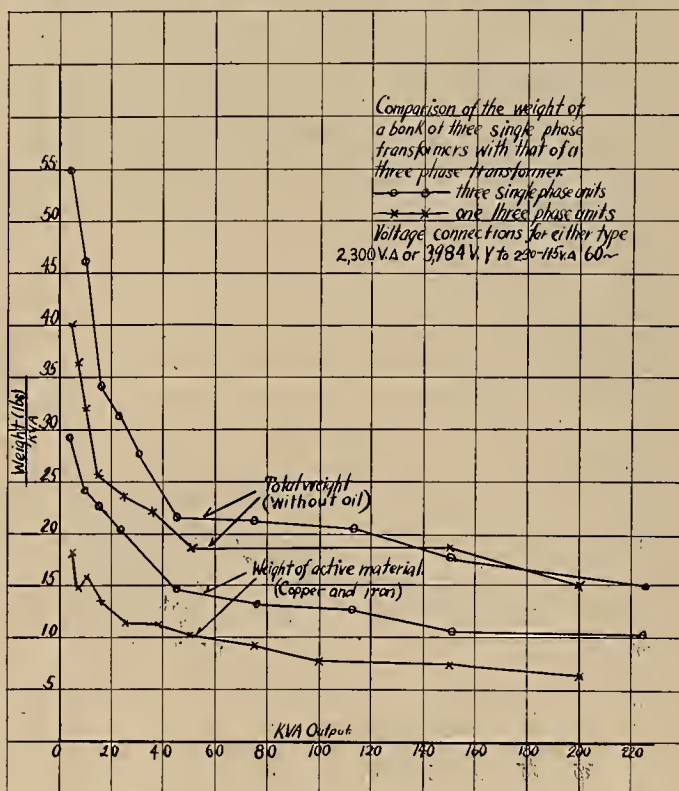


Fig. 3.—Comparison of weight, 2,300-volt type

*Distribution Transformer Sub-committee of Apparatus Committee: E. Y. Porter (chairman), N. B. Hinson, S. J. Lisberger, E. A. Quinn, C. A. Heinze, L. M. Klauber.

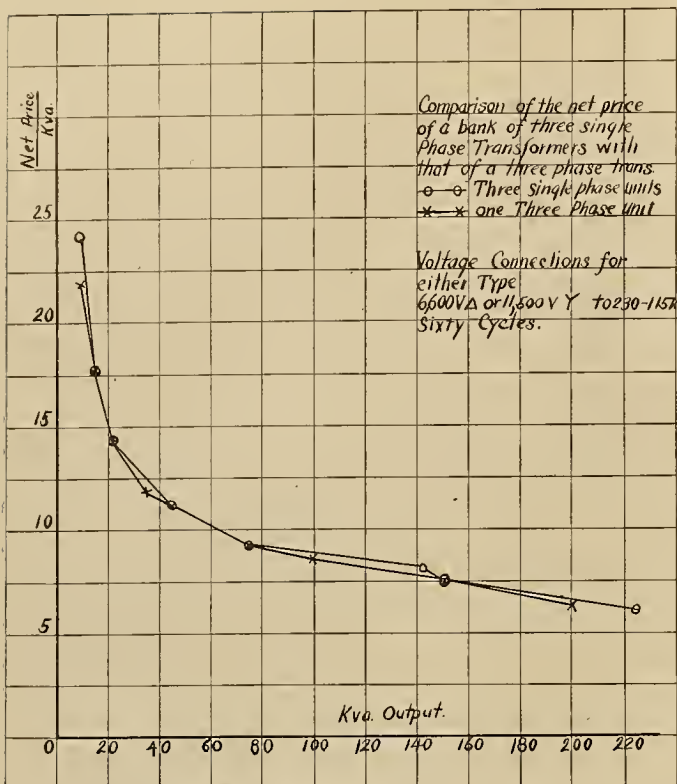


Fig. 4.—Comparison of net price, 6,600 or 11,500-volt type

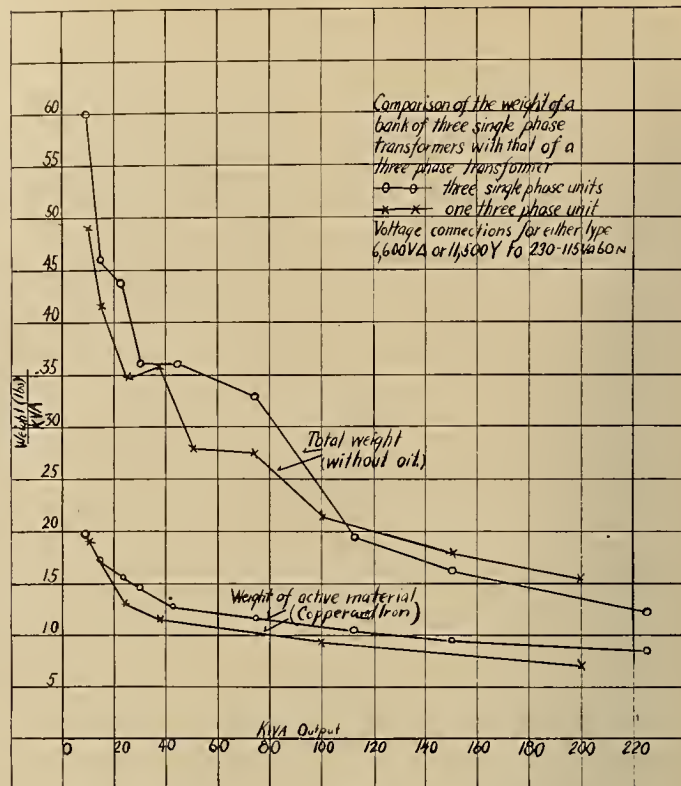


Fig. 6.—Comparison of weight, 6,600 or 11,500-volt type

voltage in the San Joaquin district is 220 volts, is largely the determining factor in favor of single-phase transformers, inasmuch as the size of one of the transformers in the bank can easily be adjusted to the size of the single-phase load. It was pointed out, however, that this unbalanced single-phase load is partially carried by all of the transformers in the bank, the proportion being approximately two-thirds of the single-phase load on the transformer in that phase, the remaining one-third being divided between the other transformers. This

matter of single-phase load from 3-phase transformers is being met, however, by manufacturers of the 3-phase transformers by bringing out a 115-volt tap for small lighting loads or by increasing the copper on one leg of the 3-phase winding approximately 20 per cent, whereby a combination lighting, heating and power load may be obtained from the 3-phase transformer, this being accomplished with very slight additional expense in the manufacture of the transformer. It is felt by advocates of the 3-phase transformer that this provision meets all of the advantages claimed for single-phase transformers and that the greater compactness and simplicity of installation of the 3-phase units more than offsets the slightly greater flexibility of the banks of single-phase transformers.

Representatives of manufacturers submitted to the committee very interesting and valuable data, covering the rela-

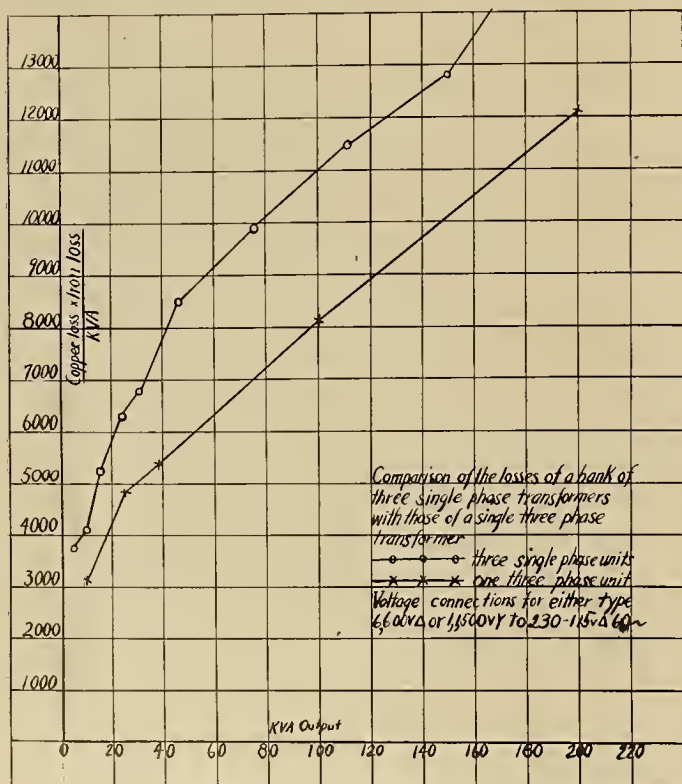


Fig. 5.—Comparison of losses, 6,600 or 11,500-volt type

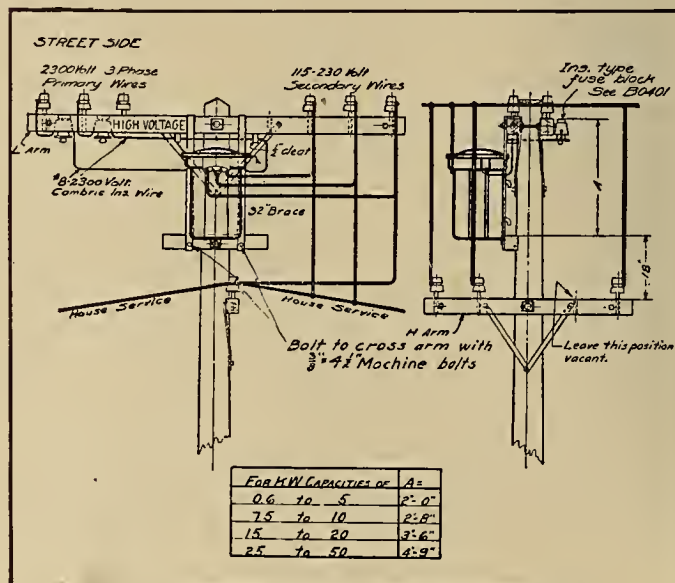


Fig. 7.—Standard hanging, one 2,300-volt transformer

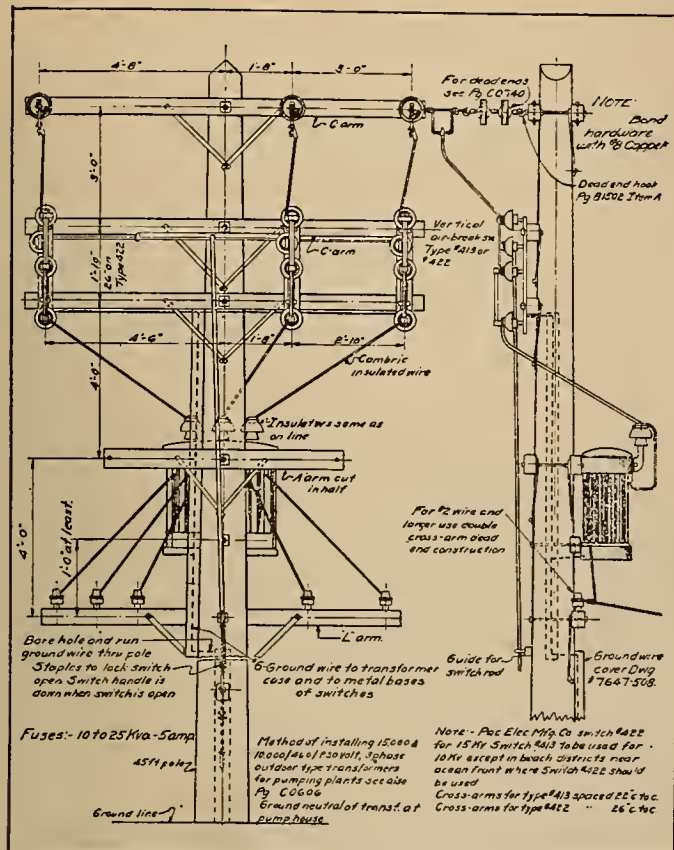


Fig. 8.—Standard hanging, one 15 and 10-kv. transformer

tive quantities of material used and costs of production of 3-phase and single-phase transformers for equivalent service. It appears that in the lower voltage—that is, 2,300 to 6,600 volts—there is very slight, if any, real difference in either cost or efficiency between the two types. Transformers of 11,000 volts and above show some advantage of the 3-phase transformer, which advantage increases with the higher voltages, amounting to from 5 to 15 per cent. The total weight of material averages approximately 10 to 20 per cent greater

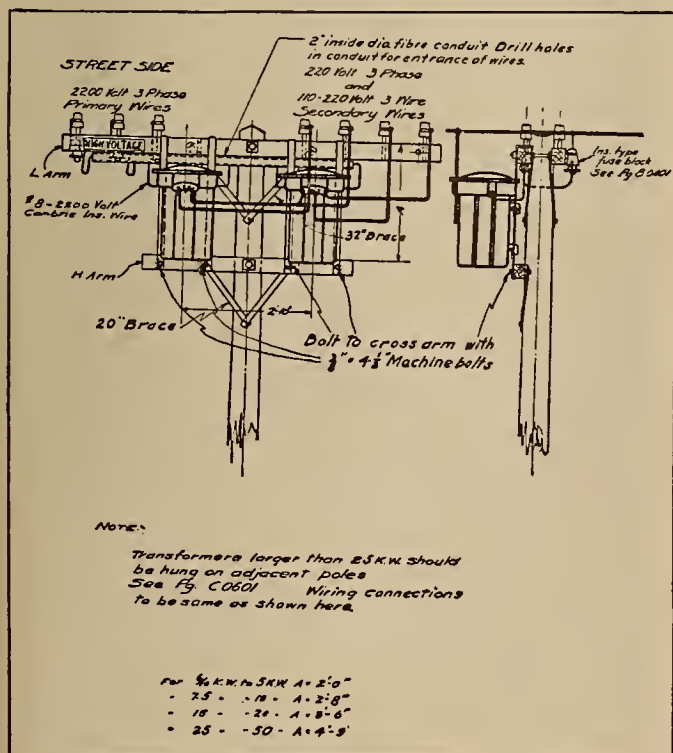


Fig. 9.—Standard hanging, two 2,300-volt transformer

for single-phase units than for 3-phase, even in the 2,300-volt class. It was pointed out that the proportion of sales for both the General Electric and Westinghouse companies for the past year has been only 3 per cent of 3-phase as against 97 single-phase, and for this reason the cost of the 3-phase is higher in proportion to the material used and must necessarily continue higher unless the proportion of output is very greatly increased. It was pointed out that this pro-

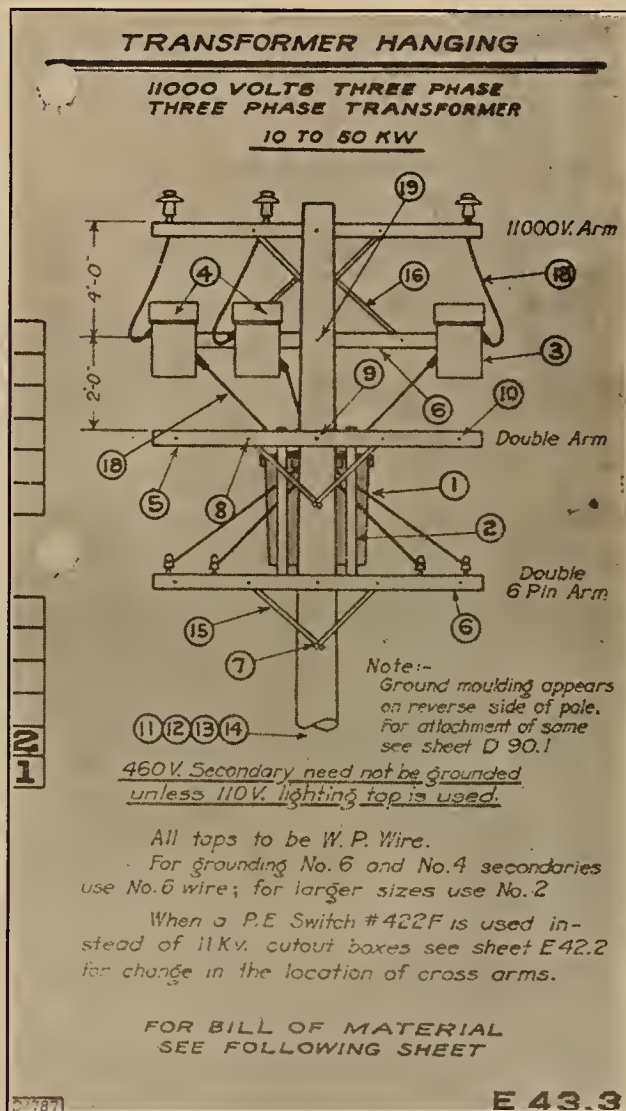


Fig. 10.—Standard hanging, 11,000-volt, 3-phase transformer

portion of sales resulted in development of the single-phase transformers being much more specialized than the 3-phase.

Methods of Mounting 3-phase and Single-phase Distribution Transformers

A large number of working drawings showing the practice of the several operating companies with respect to transformer mountings on overhead distribution pole lines were submitted and copies of some are attached hereto.

With respect to transformer protection, it appears that none of the California companies provide lightning protection for each transformer or bank of transformers, and that in some districts it has not been found necessary or advisable to provide any lightning protection except at generating or substations and the more important transformer installations. Discussion on this subject, however, seemed to indicate that more attention should be given to lightning protection than in the past, and that except in most favored localities suffi-

cient lightning arresters should be distributed over the system to drain off excessive potentials, due to lightning induction.

Practice Relative to Transformer Repairs

It appears that the practice varies widely among the various companies with respect to repairs of small distribution transformers. Generally speaking, it is not considered economical to repair damaged coils of transformers less than 3-kva. capacity, and some companies place the limit higher. Most companies purchase completely wound and impregnated coils or have them re-wound by commercial repair houses. It is apparently the consensus of opinion that it was not economical to make repairs in excess of about 60 per cent of the first cost of the transformer.

Means and Appliances for Determining Actual Load of Distribution Transformers

The most generally used method was shown to be by means of routine tests with either indicating or recording instruments determining the actual load on transformers under maximum conditions or where recording instruments are used over a sufficient period to include maximum demand. In the absence of such tests, records of approximate connected load and application of established demand factor appear to be the most generally used system of transformer load control and determination. There was evident, however, an insistent demand for some simple and inexpensive device to be applied to a large number of all transformers, which would only in-

dicate when a dangerous overload existed or had existed, but would also give at least an approximate indication of the actual maximum demand, in order that conditions of underload could be detected as well as overload conditions, it being pointed out by many operating engineers that it was materially as important to know that the transformers were well loaded as it was to guard against overload. Many devices have been produced, but it does not appear that as yet there is anything on the market which quite meets the necessary conditions of simplicity, low cost and effectiveness. A limited amount of data has been collected relative to load factors for different classes of service, but this is not of sufficient extent or in suitable shape from which to make any comprehensive report. However, due to the rapidly increasing use of combination electric lighting, cooking and water heating service, the demand factors on such service are of particular interest and further data should be collected. From the data at hand it appears that this class of service has a demand factor of approximately 33 1/3 per cent of the connected load. This has been arrived at from consideration of graphic ammeter records on transformers of 25 to 50-kva. capacity, serving groups of mixed lighting and heating loads in the Imperial Valley towns. Each of these groups represented from 10 to 15 electric range and water heater installations, combined with from 50 to 100 lighting consumers in each group, and are, therefore, considered a fair representative of this class of service where the electric range and water heater load is fairly well developed.

TRANSFORMER HANGING

CONTINUED

BILL OF MATERIAL

| ITEM | DESCRIPTION | QUANTITY |
|------|------------------------------|----------|
| 1 | K.W. 3-Phase Transformer | 1 |
| 2 | Standard Hanger | 1 pr. |
| 3 | 11Kv. Cutout Boxes (Style J) | 1 |
| 4 | 11Kv. " " (" 2) | 2 |
| 5 | Standard Transformer Arms | 2 |
| 6 | 6 Pin Cross Arm, Yellow | 1 |
| 7 | 1/2 x 3 1/2 Galv. Lag Screw | 5 |
| 8 | 3/8 x 4 1/2 " Machine Bolt | 10 |
| 9 | 5/8 x 18 " Thru Bolt | 2 |
| 10 | 5/8 x 18 " Space Bolt | 4 |
| * 11 | *6 W.P. Copper Wire | 30 ft. |
| * 12 | *Ground Wire Moulding | 30 ft. |
| * 13 | *Moulding Straps with Screws | 7 |
| * 14 | *Ground Pipe | 1 |
| 15 | 28" Galv. Cross Arm Brace | 8 |
| 16 | 36 " " " | 2 |
| 17 | 3/8 x 6 " Galv. Machine Bolt | 6 |
| 18 | *6 11Kv. R.C. Wire | 25 ft. |
| 19 | 5/8 x 14 " Mach. Bolt | 1 |
| 20 | Jackson Clamps | 3 |
| 21 | 6 Pin Cross Arm, Green | 2 |

* Omit when not grounded

E 43.31

TRANSFORMER HANGING

11000 VOLTS-THREE PHASE-OPEN DELTA

2-1KW TO 2-30 KW.

11000V. Arm

Double Arm

Clean High Tension Bushings after installing Trans formers

Double Arm

6 Pin Arm

Ground Wire

440 and 2300V. Sec. are not grounded

Ground Wire Moulding See D44.1

Strap

BILL OF MATERIAL

| ITEM | DESCRIPTION | QUANTITY |
|------|---------------------------------------|----------|
| 1 | Std. Transformer Arm | 2 |
| 2 | 6 Pin Cross Arms, Yellow | 2 |
| 3 | Cut Out Boxes and Fuses, Styles 1-3-4 | 3 |
| 4 | 28" Galv. Cross Arm Braces | 4 |
| 5 | 1/2 x 3 1/2 Galv. Lag Screws | 5 |
| 6 | 3/8 x 4 1/2 " Machine Bolts | 4 |
| 7 | Standard Angle Iron Braces | 2 |
| 8 | 5/8 x 5 " Galv. Lag Screws | 2 |
| 9 | 1/2 x 7 " Machine Bolts | 4 |
| 10 | 5/8 x 18 " " " | 2 |
| 11 | 5/8 x 18 " Space " " | 4 |
| 12 | 3/8 x 6 " Machine " " | 6 |
| 13 | Jackson High Line Clamps | 3 |
| 14 | *6 11000 Volt Rubber Covered Wire | 30 Ft. |
| 15 | 11Kv. Bracket | 1 |
| 16 | Standard 11Kv. Insulator | 1 |

Add following material if transformer is grounded:
3 lbs. #6 W.P. Copper Wire, 1 Ground Pipe, 20 Ft. of
Ground Wire Moulding, 6 Straps, 15 3" No. 13 Screws.

E 43.1

Fig. 11.—Bill of material for Fig. 10

Fig. 12.—Standard hanging, two 11,000-volt, 3-phase transformers.

PACIFIC COAST ELECTRICAL ASSOCIATION

SEVENTH ANNUAL CONVENTION

Hotel Fairmont, San Francisco, Calif.

June 19 to 23, Inclusive



HOTEL FAIRMONT

Program

Tuesday, June 19, 1923

- 9 a.m. to 12 m.—Registration
- 12 m. to 1:30 p.m.—Electric Vehicle luncheon with San Francisco Electrical Development League and Electric Transportation Club.
- 2 to 5 p.m.—Commercial and Technical Committee Meetings.
- 8:30 p.m. to 12 m.—Showing of Publicity Committee's film on Power Development and Utilization to be followed by dancing.

Wednesday, June 20, 1923

- 9:30 a.m. to 12 m.—General Business Meeting. Address of welcome by Hon. James Rolph, Jr., Mayor of San Francisco. President's Address, James B. Black.
- 2 p.m. to 5 p.m.—Commercial and Technical Committee Meetings.
- 8:30 p.m. to 12 m.—Dancing.

Thursday, June 21, 1923

- 9:30 a.m. to 12 m.—Commercial and Technical Committee Meetings.
- 12 m. to 5 p.m.—Luncheon at San Francisco Golf and Country Club and Golf Tournament.
- 8:30 p.m.—Grand Ball with special features.

Friday, June 22, 1923

- 10 a.m. to 12 m.—General Business Meeting.
- 2 p.m. to 5 p.m.—Western Development Conference. This conference will be of unusual importance and will be participated in by some of the most prominent men in the West.
- 6:30 p.m.—Banquet.
- 10 p.m.—Polyphase Pageant of Progress with 200 participants in costume.

Saturday, June 23, 1923

- 9:30 a.m.—Trip to Mt. Tamalpais over the crookedest railroad in the world, including luncheon at Tavern and return trip through Muir Woods.
- Besides this general program there will be a special program for the ladies, which follows:
- Wednesday, 9:30 a.m.—Automobile trip around San Francisco.
- 3 p.m.—Shopping tour of principal department stores.
- Thursday, 9:30 a.m.—Automobile trip of East Bay District, including luncheon at Claremont Country Club.
- Friday, 9:30 a.m.—Putting contest in lobby of Fairmont Hotel.
- 2:30 p.m.—Special trip through Chinatown.

ELECTRICAL CONSTRUCTION



ONE of the conclusions drawn by the Residence Lighting Division, Lighting Sales Bureau of the National Electric Light Association from a survey of residence lighting was that the "average wired home today might be said to be less than 'half lighted'." It is well known that a large percentage of homes are inadequately and improperly illuminated. "Inadequate," because the public has not been convinced of the importance of modern lighting, and is largely unconscious of its many possibilities; "improper," because too little thought is given by the electrical contractor and architect in the location of lighting outlets so that the maximum benefits are not derived. The proper location of ceiling and bracket outlets is of the utmost importance, as one lumen applied in the proper direction is of more value than ten applied in a haphazard manner.



Fig. 1.

The average kitchen is an example of "how it should not be done." In the majority of instances the only means of illumination is a single ceiling light in the center of the room so that the housewife stands between the reflected light and the work which she is performing. Examples of bad practice (Fig. 2) and correct illumination (Fig. 1) are shown in the accompanying sketches. The kitchen should be provided with a bracket light over the center of the sink, controlled by a push switch. A central ceiling light, preferably of the enclosing "mushroom" shaped globe of white glass, is necessary and should be equipped with a lamp of adequate wattage.

A large kitchen should have an additional light over the stove or table. The range, especially where a cabinet warming oven extends the full length of the range, is most difficult to light from

By E. Earl Browne

AS Mr. Browne points out in the accompanying article "one lumen applied in the proper direction is of more value than ten applied in a haphazard manner." A little thought given to the placing of sockets or outlets at convenient places, especially in the location of lighting outlets, will in many cases greatly improve the electrical installation.



Fig. 2.

any position. This difficulty can be overcome by placing one or more outlets under the hood. In case outlets are installed under the hood, surface type pipe fittings with keyless porcelain receptacles should be used, and slow burning (type S. B.) wire. The conduit can be run down the rear of the range and through the floor and over to the control switch on the wall. Fig. 3 shows a recom-

mendation which is not, in my opinion, good construction, as in order to be low enough to illuminate all of the utensils and their contents, the lamp would be in the housewife's way when using the range.

A built-in or flush type ironing board is in many cases installed in the kitchen. This also is seldom properly lighted. A woman when ironing stands on the right hand side of the board and the light source should therefore be directed so as to eliminate any chance of her forming a shadow on the work.

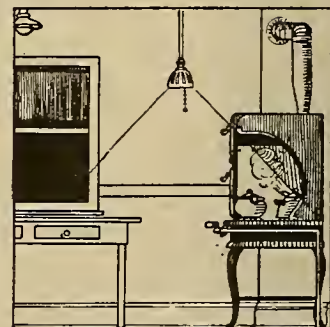


Fig. 3.

The laundry washtrays should be illuminated by a ceiling outlet two feet from the wall and in line with the extreme right or left hand end of the trays, depending on whether the washing machine is to operate in or out of the left or right hand tub. The sketch (Fig. 9) shows the correct position for a left-hand machine. This also provides illumination in case it is desired to use a portable ironing board in the laundry as is indicated in Fig. 5.

All closets, and particularly clothes closets, should have the outlet over the door. In many cases inspection departments insist on this location due to the fire hazard if it is placed on a side wall or near a shelf where combustible material might come in contact with it. A flush door switch of the open circuit type will insure that the light is not left burn-

ing when the door is closed. With this type of installation, in order to overcome the disadvantage of requiring that the closet door be kept tightly closed, a key or pull socket should be provided, in case it is desired to air the closet during the day. In a pantry closet where the door is apt to be kept ajar a pull socket, as in the accompanying sketch, (Fig. 4) or a push switch should be provided.



Fig. 4.

The average home does not contain a sufficient number of wall brackets. This is particularly true of the bath room. The bath room mirror is rarely ever properly illuminated, particularly for shaving. The mirror should be lighted by two brackets (double the number usually employed), one on each side of the mirror and about four inches below the center. A correct installation is shown in Fig. 8. The light on either side of the mirror will direct the light upon the face, where it is most needed.

In the bedroom specialized lighting rather than general illumination is the essential requirement for comfort. Mirrors are apt to be moved from time to time to suit the aesthetic tastes of the occupant. It would be by the merest luck if bracket outlets were placed to fit mirrors of varying size and shape. It is therefore preferable to wire the furniture. By having convenience outlets on the four sides of the room it is always possible to arrange the dressers or dressing tables as desired, still having the proper light on either side of the mirror and level with the face. The sketch (Fig. 6) shows the inadequacy of having only a central fixture suspended from the ceiling, contrasted with proper brackets. Convenience outlets conveniently located in the bedroom insure comfort in the use of warming pad, reading lamp, curling iron, vibrator and other devices.

The dining room should be the easiest to illuminate and more a problem of the fixture designer. Although wall brackets can be effectively used over buffet or serving table, a central ceiling outlet is all that is usually required. In case a pendant bowl

type fixture is used, the dome should be placed high enough so that the vision across the table is not obstructed, yet low enough to protect the eyes from the rays of the light within. In general, if a distance of 22 in. between the top of the table and the bottom of the fixture is maintained the results desired will be obtained. This is shown in an accompanying diagram (Fig. 7). In the dining room and breakfast room a floor plug should always be installed in order that percolators, toasters, chafing dishes, or portable lamps may be easily connected by use of a multiple receptacle.



Fig. 9.

An Inquiry About Service Switches

Referring to Fig. No. 2, page 332, of the May 1 issue, a reader has asked why the meter was shown at the top of the service switch instead of at the bottom, since the method shown required the wire being run from the bottom lugs of the switch up to the meter and back to the busbar trough. This, in his opinion, seemed a rather difficult job.

In reply, I must agree that this recrossing of wires seems quite unnecessary, but as the wire used in this case is but No. 2 B. & S. gage the extra work involved is not serious, and at the present time this is the only answer to the problem if a symmetrical job is to be done, for the following reasons:

- 1st—Entrance switches for use with meter protective trims are made "open-top-end" only.
- 2nd—Present stocks of power company's meters are bottom connected.

While it is true that the bus cabinet and circuit switches could be placed on a line above the handle of the entrance switch, thereby eliminating the wires from load side of meter running beside switch, it is, however, a much neater job if both entrance and circuit switches line up as nearly as possible. This could be done by placing the circuit switches below the busbar trough, but, since circuits generally run to the ceiling and not to the floor, this would necessitate the use of "L" type of exposed conduit fittings, and is not to be recommended.

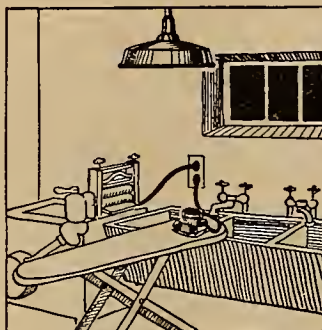


Fig. 5.

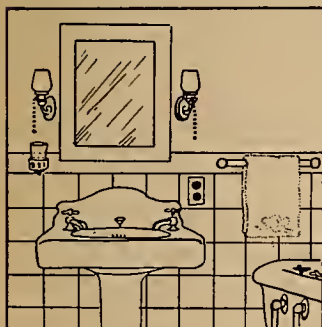


Fig. 8.



Fig. 6.

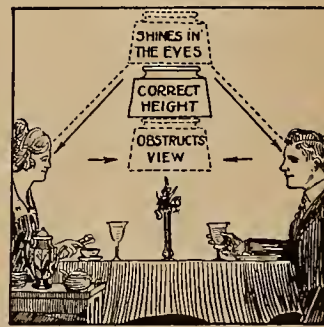


Fig. 7.

JOBBER, DEALER AND SALES AGENT



Develop Demand for Better Church Illumination Electrical Service League of British Columbia Offers to Aid Churchmen in Improving Lighting Conditions

By securing the interest of the ministers and governing boards of the churches of Vancouver in proper illumination of their churches the Electric Service League of British Columbia is gradually getting the attention of the congregations turned toward a real interest in proper electrical installations.

The interest of the ministers and governing boards was obtained through the medium of direct mail advertising. Two letters were mailed, at an interval of one month, to allow for the meeting of the governing board in each church.

Letter No. 1

Dear Sir:

A poorly designed lighting system for the interior of a church affects not only the minister but his congregation.

He looks into the blazing lights instead of into the faces of his parishioners. They, in turn, suffer from eye fatigue, drowsiness and headaches caused by the same improperly concealed or shaded lamps. Because of the irritation they fail to sustain an interest in the service.

The congregation of any church is made up of three types—the person who attends regularly, the casual churchgoer and the one who attends because some one insists that he go to church just this once.

The first type will always attend, the second is apathetic and the third attends under compulsion. In order that a church may serve its little community to the fullest extent it must attract and hold the last two types or classes of people—to do this outside irritations must be removed.

A well lighted church is an attractive church and houses an attentive congregation.

Our business is illumination, and we will be very glad to advise you as to proper illumination. I trust we can be of service to you in a purely advisory capacity, for which service we make no charge.

Very truly yours,

SECRETARY-MANAGER.

Letter No. 2

Dear Sir:

Since writing your church on the subject of illumination recently I have made this very interesting discovery—IF OUR HOMES WERE AS POORLY LIGHTED AS MANY OF OUR CHURCHES our eyes would soon be seriously affected.

Congregations recognize that discomfort and irritation result from poor lighting and various arrangements of controlling the lights are tried to overcome the obstacle of improper lighting.

This discomfort is an obstacle over which the minister must carry his message to the congregation. To get the maximum effect from any speaker's effort the audience should be entirely at ease and able to look at the speaker without the least possibility of irritation from eyestrain. Such irritation to the members of a congregation can be removed by the use of proper luminaires.

Our business is illumination and we are offering to render you a free service in advising as to the proper illumination of your building. A number of churches have already availed themselves of this opportunity. Are you going to miss the chance of finding out what is really

wrong with the lighting installation in your church?

For this service write to the address on this letterhead or telephone Seymour 5000 and ask for the Electrical Service League.

Very truly yours,

SECRETARY-MANAGER.

Church lighting is notoriously bad and is a constant annoyance to the congregation, so that the offer of advice as to a proper lighting installation has met with a good response. Already a number of churches are preparing to change their lighting installations as the result of this campaign.

Through the cooperation of the central station, churches desiring to make such a change have been furnished with a complete layout by the illumination engineer of the central station. Architects, too, have recognized the value of the service offered and have obtained the advice of the fieldmen for the league on the electrical installations in several new churches under construction.

The campaign is still in progress, but results are already gratifying.

SUCCESS NOT A CHANCE— LUCKY STIFFS BARRED

By JOE OSIER

Several thousand years ago as the summer sun was clipping the hilltops and the birds were tunefully warbling—

O, Happy Day—

Hairfaced Harry, the Sage of Stoneville, hastily swallowed the last bite of marrow in his cave, wiped his greasy hands on his flanks, picked up a chisel and hammer and began—

Pecking away on an editorial headed "Success."

Laboriously he spelled out these lines: "Some people think of success as chiefly a matter of chance, of good or bad luck, when in reality it is more a matter of choice than of chance."

This task completed, he buzzed for his stenographer, telling her to "strike off 10,000 copies and dispatch them on the afternoon stone boat—then—

Hairfaced Harry called it a day, picked up his golf clubs and dangled out in the country for a few rounds of prairie pool.

And, today, conditions and men are practically the same.

For instance: William William McWilliam, noted author and "wise cracker," buzzes for his stenographer and says: "Liztakeletter."

And he begins: "To the employees of The Wonder Working Woofus Works:

"Some people think of success as chiefly a matter of chance, of good luck or bad luck, when in reality it is more a matter of choice than of chance. * * *

And in this day of Our Lord, 1923, sitting in my office with the sounds of the city all about me, I am glad that I am forced to agree—

"Ain't it the truth."

And it is the truth—and when the men engaged in all lines of endeavor hug this truism to their palpitating bosoms—

There will be fewer overdue notes and many healthier bank balances.

I realize, it is extremely hard for the second low boys, who have been ached out of a fat contract to sing:

"We'll get pie in the sky"—still—

Seeing that Success is a flirtatious wench and hard to woo, the reward cannot be expected to come easily—however:

Success can be wooed and won and wedded, as has been proved by men who started in life with less than nothing and finished with everything—

Including a pass inside the Pearly Gates.

Still, seeing that most of us are interested mainly in assuring ourselves a competence and a "place in the sun," I shall refrain from further remarks about things I know nothing of—

Including the Pearly Gates—and—

Continue with the subject of Success because—

I know, surely, Success will dog the footsteps of any man who—

Does the right thing, in the right way at the right time—

Providing he does it often enough.

Success is not a matter of chance else there would be more successful men—because—

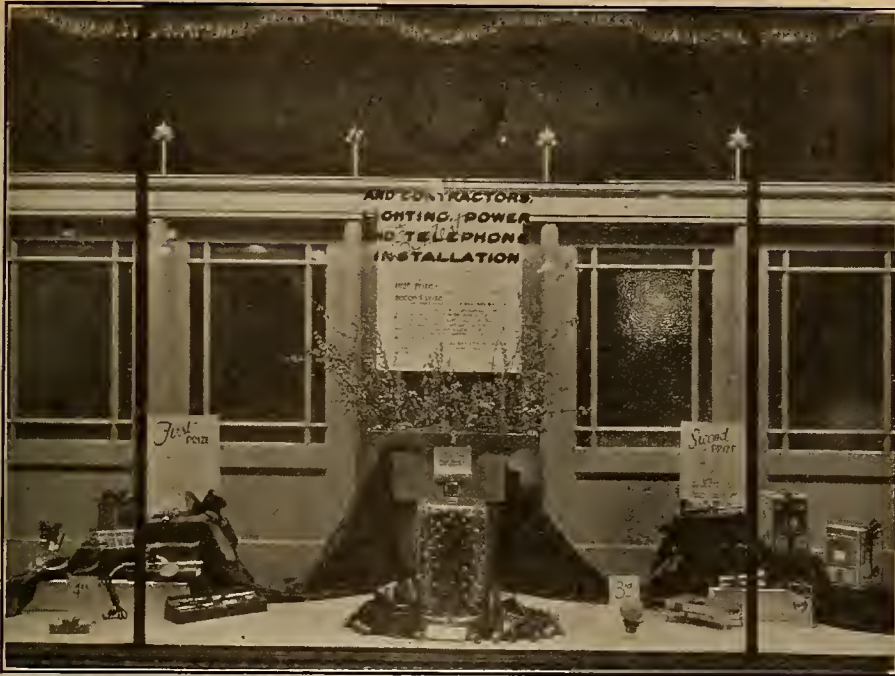
Every day men are taking chances.

And some wake up in the hospital—some at the Poor Farm and others are standing in line in front of soup kitchens.

In my opinion, which is worth whatever you think it is, the men who think Chance and Success are twins, had better get out of the race and let somebody run—

That can run.

If I'm wrong, show me where.



This window display of J. J. Agutter & Company, Seattle, Wash., gave passers-by an opportunity to guess how many plugs were in the vacuum jar. Prizes given to winners may be seen on the sides.

Pull the Casual Window-Shopper into the Store

Seattle Electrical Contractor-Dealer Introduces Large Number of Prospects to Store by Using Guessing Contest

To the average citizen the contest in which he can use his wits to secure a prize at no cost always has a definite appeal. Guessing contests that permit people to state the number of articles that are assembled in a certain space have always proved popular means of attracting attention. The electrical dealer has been rather handicapped in this field because most of his stock is of such a nature that he cannot group it for the purpose of arranging a contest. The size and delicacy of electrical appliances have been obstacles which prohibit the dealer from pouring them into a pile for guessing purposes.

J. J. Agutter & Company of Seattle, Wash., overcame this difficulty by filling a vacuum jar with Clearsite plug fuses. Plug fuses are small enough and are strong enough to permit the dealer to put them in a jar and mix them up sufficiently to make the guessing fairly difficult.

The Seattle firm did this and placed the jar of fuses in the display window, using appropriate hand lettered cards to announce the contest. These cards stated the rules of the contest and told the people who stopped to look at the display how guesses might be made.

The rules of the contest were as follows:

Guesses are free and you do not have to make a purchase.

Contest is open to anyone not connected with this firm and will be run for two weeks.

The winners will be—

First Prize.—The first correct or nearest correct guess deposited.

Second Prize.—The second correct or nearest correct guess deposited.

If two or more deposit the correct answer prizes will be awarded in the order of date deposited. All tickets are numbered and dated. Get your ballots inside and deposit in box. The winning names and numbers, together with the

correct count, will be shown in this window after the close of the contest, March 12.

Prizes will be awarded upon presentation of duplicate receipt and proper identification of holders.

As may be seen from these rules, the company protected itself from the possibility of having to give two prizes in case of duplicate answers. By dating the guesses, the company protected itself and made the contest more systematic. Early entrants were given a preference in this way and it tended to make passers-by make their guesses immediately instead of waiting to do so.

The prizes given were of course electrical appliances. The winner of the first prize was given a choice of a Westinghouse toaster, Universal electric iron, Universal or Westinghouse curling iron. A package of six 40 or 50-watt Westinghouse Mazda lamps, a Diamond focusing or Eveready flash lamp, a Holdheet grill or curling iron, were the articles from which the winner of the second prize could take his choice. Third and four prize winners were given no choice.

The results of the contest were very gratifying to the management of the Seattle store. A number of prospective customers were introduced to the store through the contest and trade was stimulated considerably. The receipt which was given to each person who made a guess contained a complete list of the appliances carried by J. J. Agutter & Company and served as a good piece of direct advertising. In conducting a campaign of this nature it would also be possible to secure a good mailing list by taking the names of all contestants.

The Seattle dealer was aided in the contest by W. E. Jones, local manager of the Economy Fuse Company, the distributor for the line of Clearsite fuses.

Los Angeles Attorney Prepares Mechanics' Lien Form

The mechanics' lien law, being a summary and preferential remedy, has long been strictly construed by the courts. There are often so many angles involved in the foreclosure of a mechanics' lien, where other liens, mortgages and trust deeds are involved, that this branch of the law has become more or less a specialization, and many attorneys specialize solely in this practice. Mechanics' lien laws have been frequently changed and amended, and forms that were at one time sufficient, may now be defective. For the purpose of providing a simple method of enabling the electrical contractor to file a lien to secure labor or material, Attorney Earl E. Moss, 624 Stock Exchange Building, Los Angeles, has prepared a form for liens, with instructions for filling it in, for free distribution to contractors in Los Angeles and vicinity. Mr. Moss has written the Journal of Electricity and Western Industry as follows:

"It is the practice of many electrical contractors to use the stock forms that may be purchased in any stationery store for preparing and filing liens. Where the amount involved is small, the expense of employing an attorney to prepare the lien is not justified, and the filing of such liens, even though sometimes defective, oftentimes force payment or compromise of the claim.

"These forms are occasionally used, however, for filing liens where a considerable amount is involved, which are contested and require a court action to foreclose, and in such cases are subjected to a careful scrutiny for defects. Many of these forms do not comply with the amendments and changes in the law. I have printed forms that I use for filing liens, together with instructions for preparing lien, which any electrical contractor may secure without charge or obligation of any sort by calling at my office, or they will be mailed upon a telephonic request.

"Another matter that is often overlooked by laymen in filing these mechanics' liens is that the lien continues in force for ninety days only, unless action be instituted for foreclosure, or unless by agreement of both parties a credit is given, which extends the time for filing the action ninety days after the expiration of such credit, but even such agreements to extend credit cannot continue the lien in force longer than one year, unless an action be filed."

Mr. Moss specializes in law practice in the electrical industry. He prepared the form of lease contract for the sale of washing machines, vacuum cleaners, and other appliances, upon deferred payments, that was adopted by the Electrical Retail Dealers' Association of Los Angeles. He also prepared the form of wiring contract described and printed on pages 146 and 147 in the issue of Feb. 15, 1923, of the Journal of Electricity and Western Industry.

INDUSTRIAL NEWS



Organization Opposes \$35,000,000 Los Angeles Bond Issue

Opposition to the \$35,000,000 bond issue for the Public Service Commission of the City of Los Angeles, which will appear on the municipal ballot on June 5 as Proposition No. 6 has taken definite form in the formation of the Los Angeles Taxpayers' Association, by a group of prominent citizens. Approximately \$10,000,000 of the money to be derived from the bond issue is to be spent for rehabilitations to the distribution system of the city and additions to the present hydroelectric system. The remaining \$25,000,000 is to be used for the power development at Boulder Canyon on the Colorado River.

William C. Warmington, who has been active in civic-betterment movements, is chairman of the new organization, and among the leading citizens at the head of it are William May Garland, Harold L. Arnold, D. A. Hamburger, M. A. Hamburger, Fred L. Baker, O. P. Clark, Louis M. Cole, B. H. Dyas, Mrs. Cora Deal Lewis, Mrs. Charles F. Gray, W. W. Mines, Ralph Hamlin, Robert H. Moulton and J. B. Van Nuys.

In a formal statement issued by Chairman Warmington, the association makes the following points against issuance of the \$35,000,000 in bonds:

"Voters are called upon to express themselves at the June 5 election on the question of issuing \$35,000,000 more of power bonds, \$25,000,000 of this Los Angeles money to be spent in the State of Arizona when the Boulder Canyon Dam is completed.

"There is no dam at Boulder Canyon as yet. The Federal government will build that project, not Los Angeles. Seven states must consent to its building and seven states will receive the benefits. They are Wyoming, Nevada, Colorado, Utah, New Mexico, Arizona and California.

"The Federal government will provide for the development and distribution of power, not Los Angeles or any other city. That point has been agreed upon by the states interested. Government engineers estimate that the cost of the dam, power plants and transmission lines will be \$133,000,000.

"Interference by Los Angeles at this time can do nothing but impede the government. Six of the seven states which control the waters of the Colorado River have ratified this agreement, but Arizona has not approved the pact and its final favorable action is being prejudiced by the Los Angeles agitation."

Seattle Company Plans Erection of Connecting Line

The Puget Sound Power & Light Company has recently made application to the county commissioners of Thurston County, Washington, for a permit to erect a transmission line from Olympia to Tenino, Wash. This line would be the connecting link in the Stone & Webster system in western Washington. The line would give a continuous system extending from Bellingham on the north to the Columbia River on the south.

The company has had a high tension power line from Tacoma to Olympia and Tumwater for several years, bringing the current from the Snoqualmie power plant for use of the Olympia Light & Power Company during the hours of its peak load. The Stone & Webster interests also have acquired control of the North Coast Power Company, which operated its power plant in Kalama and served Chehalis, Centralia and Tenino. This gap between Olympia and Tenino is now to be closed.

This will provide a safeguard in case of accident to a power plant, since all the generating plants of the company will be linked up and emergency service could be maintained with one plant down. Also, in the hours of peak load, it permits drawing from whatever plant has surplus power available.

The company has acquired the light and power system at Aberdeen. Construction work is in progress to connect Olympia and the Aberdeen plant through Montesano over the Olympia Highway commonly known as the McCleary Road. The Olympia-Tenino link will also serve to tie in the Grays Harbor system with the Kalama plant.

Suit to Secure Return of Water Right Opened by Company

The Progress Company, of Murray, Utah, has filed suit in the Third District Court against Salt Lake City. The company asks that an order of the state engineer denying the company the use of 100 sec.-ft. of water from the Big Cottonwood stream and diverting it to Salt Lake City be annulled and revoked.

The history of the controversy between these two agencies, now parties to the suit, dated back to 1909, when the Progress Company applied to the state engineer for the diversion of 100 sec.-ft. of water from the Big Cottonwood stream. Notice of the application was published, the complaint states, and a protest filed by Salt Lake City against the granting of the application. The protest was denied and the application for the water was granted. A court decision in 1911 brought by the city was dismissed.

In November, 1921, the city entered another protest with the state engineer against the use of 100 sec.-ft. of water by the Progress Company, on the ground that the company had not instituted improvements on a power project promised when granted the water right. This protest was sustained by the state engineer and the recovery of this water is now sought by the company. The complaint enumerates a number of construction projects which are now under way.

Street Railway Gives Order for Converter Equipment

The Market Street Railway of San Francisco has ordered additional converter equipment for its substations with a total rated capacity of 5,000 kw. This will be made up of two machines; one of 3,000-kw. and one of 2,000-kw. capacity.

The larger machine will be installed in what is termed the Down Town Substation. This station was originally equipped with two 2,000-kw. converters and the added machine will therefore bring the rated capacity up to 7,000 kw.

The general growth of street railway traffic in the congested down town district of San Francisco calls for this material increase of capacity. The departures from previous practices, incorporated with the original equipment will be continued in the extensions. The chief departure was the use of means for voltage control by varying, under any load condition, the number of primary turns in the transformers. The equipment for this purpose has proven highly satisfactory.

The new 3,000-kw. machine will be built for directed ventilation and will therefore avoid the usual difficulty of cooling such machines in substations on closely built up property. This will be the first railway converter to be so equipped. The air passages through the machine will be so arranged as to take air into the armature from the room at both the collector and commutator ends, and to blow it out radially around the pole structure into air ducts by which it will be carried away. This will avoid any enclosure of the parts requiring inspection and attention.

The 2,000-kw. machine ordered at the same time will be installed in the Eighth Avenue substation of the railway company to take care of the increasing travel in what is known as the Richmond District. This will also be equipped with means for voltage control similar to that referred to above, but will not have directed ventilation.

The order for the 3,000-kw. machine has been given to the Westinghouse Electric & Manufacturing Company. The order for the other machine has been given to the General Electric Company. The extensions are being carried out under the direction of Ford, Bacon & Davis, Inc., consulting engineers.

The enforcement of electric wiring rules in Colorado Springs, Colo., is being pushed by Joe Caldwell, city electrician, according to recent reports. The fact is evidenced by the number of violators brought before the police court in that city in every case of which a conviction has been secured.



Lewis A. McArthur, addressing the visitors prior to the starting of the new plant. Miss Prudence Talbot, who threw the switches that started and synchronized the plant, may be seen on the extreme left of the speakers' platform.

Powerdale Plant Is Dedicated by Oregon Company

Daughter of President of Pacific Power & Light Company Throws Switch and Starts 9,000-hp. Hydroelectric Plant

With appropriate ceremonies the Pacific Power & Light Company dedicated its new Powerdale hydroelectric plant on the banks of Hood River on May 10. Nearly 1,000 persons watched Miss Prudence Talbot of Portland throw the switches that started the water wheel and generator and synchronized the electrical apparatus with the plants operating on the systems of the Northwestern Electric Company and the Portland Railway, Light & Power Company which operate in unison with The Dalles-Hood River system of the Pacific Power & Light Company.

This hydroelectric development is situated on the east bank of the Hood River about one-half mile south of the city of Hood River, and is visible from the Columbia River Highway bridge, and also from the new Mt. Hood Loop Highway. The plant is modern and up-to-date in every respect and has a capacity of approximately 9,000 hp. It was built by the Phoenix Utility Company, a construction concern affiliated with the Pacific Power & Light Company. Construction work was started June 1, 1922, and in less than a year the plant was ready for service. Had it not been for exceptionally bad weather conditions last winter the new plant would have been available on April 1. The plant is one of a number operated by the Pacific Power & Light Company, which has headquarters in the Gasco Building, Portland, and serves the Astoria-Seaside district, The Dalles-Hood River-White Salmon territory and the entire southeast part of Washington from Yakima to Pomeroy, with branch lines as far south as Pendleton.

The dedication exercises were in charge of Lewis A. McArthur, vice-president and general manager of the Pacific Power & Light Company, who acted as master of ceremonies. Preceding the exercises, the Phoenix Utility Company served a buffet luncheon at its camp site and more than 700 persons partook of the refreshments. The opening remarks were made by Guy W. Tal-

bot, of Portland, president of the Pacific Power & Light Company. Mr. Talbot spoke briefly of the development and enumerated some of the difficulties that



Guy W. Talbot, president of the Pacific Power & Light Company (right), and Lewis A. McArthur, vice-president and general manager of the company, two of the men prominent at the dedication ceremonies of the Powerdale Plant. Miss Mary Lawrence McArthur is being advised to keep out of the picture.

had been overcome, and praised those in charge of the construction work, including H. H. Schoolfield, chief engineer, and J. E. Shinn, superintendent of

construction. Immediately following Mr. Talbot's remarks, Mr. McArthur introduced L. B. Gibson, superintendent of schools for Hood River County. Mr. Gibson was followed by Judge Fred W. Wilson, of The Dalles, Circuit Judge of the Seventh Judicial District and president of the Oregon Bar Association. Mr. McArthur then introduced various company officials, including John A. Laing, vice-president and general attorney, Geo. F. Nevins, secretary and treasurer, John V. Strange, assistant general manager, H. H. Schoolfield, chief engineer, J. E. Shinn, superintendent of construction, Berkeley H. Snow, district manager at Hood River, and J. B. Kilmore, district manager at The Dalles, who is also superintendent of power of The Dalles-Hood River system.

Miss Prudence Talbot, daughter of Guy W. Talbot, dedicated the plant by pulling a lever which opened the Johnson hydraulic valve and admitted water to the power wheel, and as she did so said, "I dedicate you to useful public service." As soon as the water wheel was up to speed Miss Talbot operated several electric switches which synchronized the generator with the generators on the power system of the Pacific Power & Light Company, the Northwestern Electric Company and the Portland Railway, Power & Light Company which are operated as a single system. The machine slipped into speed and immediately picked up a load of about 5,000 hp. This is the first time on record that a young lady of Miss Talbot's years has been known to synchronize a power plant of 9,000-hp. capacity.

Water to be used in the Powerdale plant is diverted from the Hood River about 3½ miles from its mouth by means of a diversion dam equipped with steel roller gates, which are electrically operated. The plant operates under a 187-ft. head, the water being led 15,985 ft. through a pipe line. This line provides the turbine with 500 sec.-ft. of water.

Report Discourages Erection of Municipal Water Plant

The report prepared by a special committee of the Chamber of Commerce of Logan, Utah, recommends that the city abandon plans to erect a new power plant and instead suggests that the city continue to purchase power wholesale from the Utah Power & Light Company. The report states that by purchasing power from the power company, the city can save approximately \$5,000 a year.

A consulting engineer employed by the city to investigate the advisability of erecting a new municipal power house, estimated that the cost of this development would be approximately \$266,000. The development suggested would be erected to operate at full efficiency at flood stages of the river only.

At present the municipal power bureau of Logan is supplying about 40 per cent of the city with power and light. About one-half of the power retailed by the city is purchased from the Utah Power & Light Company at a very low rate. The contract for power secured from the central station company has several years to run and permits the city to take any amount that it may require.

California Wire Company Opens San Francisco Warehouse

The California Wire Company of Orange, Calif., has recently opened a new warehouse in San Francisco where the company intends to carry a large stock of wire. The new building which was erected especially for the wire company is located at 431 Bryant Street.

J. N. Addis has been named branch manager for the San Francisco territory and it was under his direction that the new establishment was opened. Charles L. Hill, sales manager of the wire company, was in San Francisco for the opening of the warehouse. According to Mr. Hill, the company intends to carry a stock of about 150,000 lb. of wire at the new location. This will be on hand to supply local customers of the company who are in need of immediate delivery.

The California Cotton Cordage Company, a subsidiary of the California Wire Company, is increasing the capacity of its plant so that more insulating material can be made for the wire com-

pany. The cotton mill, which is also located at Orange, has been operating only a short time, but has already proved that it will be a success and that it can supply the insulating cotton needed by the wire company. A new machine has been ordered which, according to Mr. Hill, will double the capacity of the mill. The wire company is now taking the entire output of the cotton mill.

Arrangements are being made to hold a convention of the Mountain Division, Association of Electragists, International, at the Albany Hotel, Denver, Colo., on July 16. James R. Strong, of New York, who is president of the association, will address the convention as will also John F. Greenawalt, publicity manager of the Mountain States Telephone & Telegraph Company, Lawrence W. Davis and Arthur P. Peterson, the field man for the mountain division of the association. Complete details for the convention have not been definitely arranged.

Harris J. Ryan Officially Named President of A.I.E.E.

Prof. Harris J. Ryan, of Stanford University, was declared officially elected president of the American Institute of Electrical Engineers for the coming year by the committee of tellers of the Institute at the annual business meeting on May 18. The other officers elected are: vice-presidents, H. E. Bussey, Atlanta, Ga.; S. E. M. Henderson, Toronto, Canada; William F. James, Philadelphia, Pa.; J. E. Macdonald, Los Angeles, Calif.; Herbert S. Sands, Denver, Colo.; managers, H. P. Charlesworth, New York, N. Y.; William M. McConehey, Pittsburgh, Pa.; W. K. Vanderpoel, Newark, N. J.; and treasurer, George A. Hamilton, Elizabeth, N. J.

These men with the hold-over officers will constitute the board of directors for the administrative year starting Aug. 1. Twelve states and Canada will be represented on the new board of directors.

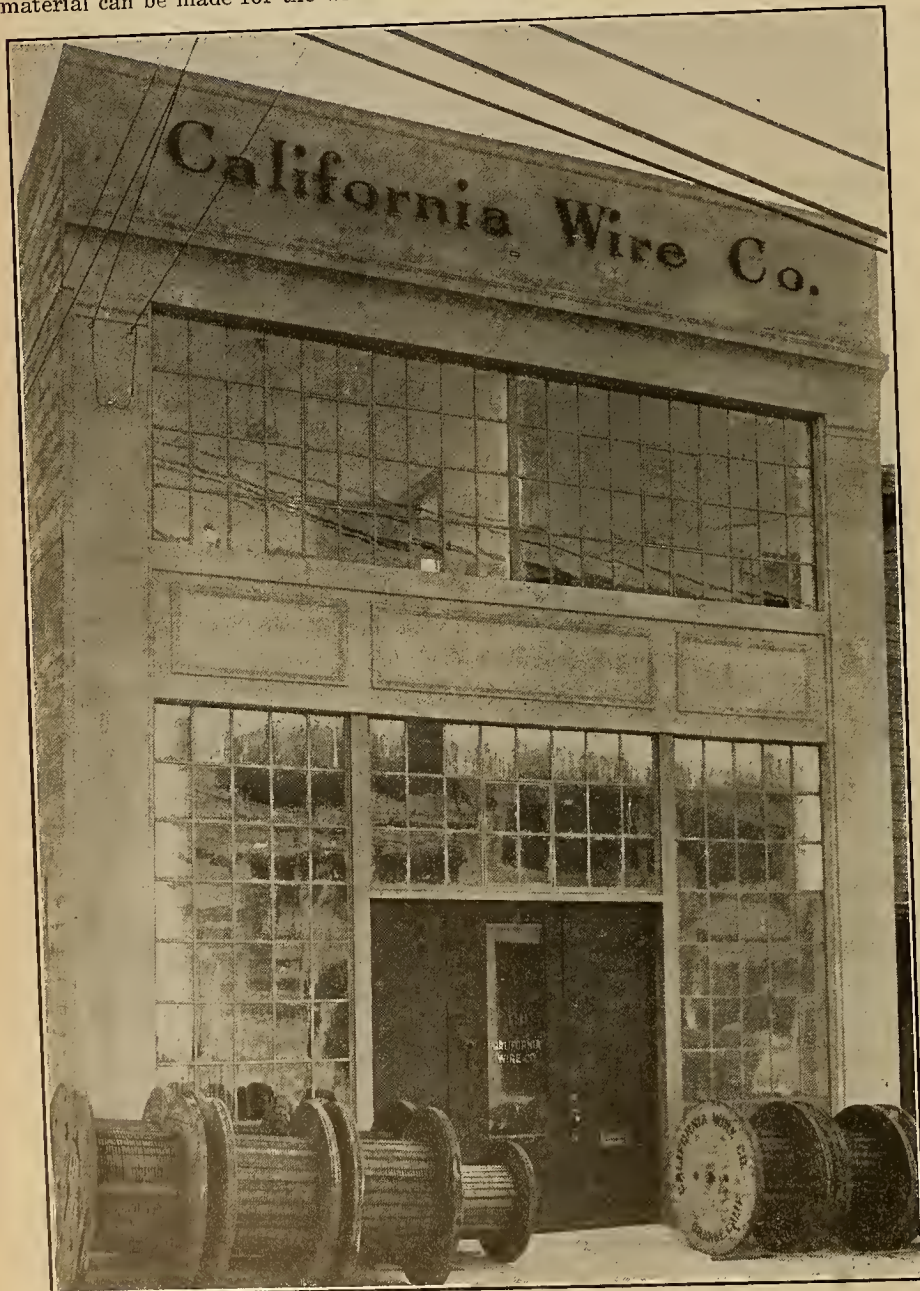
Executives Visit Extensions of Spokane Power Company

During the week of May 7, a general survey of properties and territory of the Washington Water Power Company around Spokane was made by the following officials: D. L. Huntington, president; M. W. Birkett, general manager, both of Spokane; W. A. White, Frank Lyman, W. J. K. Vanston, New York directors; and W. B. Binnian of Boston, a stockholder of the company. The party inspected the Kettle Falls power site, the holdings of the Okanogan Valley Power Company, acquired last year by the Washington Water Power Company. The extensions of power transmission lines from the Big Bend country to the Columbia River connecting with the Okanogan system, the lines built into the Lake Chelan district, the lines built last year into the Ephrata and Moses Lake country in Grant county, and the recent extension to Quincy were also visited.

The Washington Water Power Company of Spokane, Wash., has been enlarging its territory during the last year, and in the near future will probably make application to the Federal Power Commission for a permit to begin the development of Kettle Falls, a power site on the Columbia River about 100 miles north of Spokane.

An advertising campaign designed to tell the people of Seattle about the municipally owned utilities of the city will be launched by the city council some time in the near future, if the plans submitted to that body by Supt. George F. Russell of the public utilities department are adopted. An appropriation of \$40,000 a year for advertising purposes has been taken under advisement by the city council utilities committee. The money is to be furnished by the light, water and street railway departments.

Ordway, Crowley, and Sugar City are three small Colorado towns which have been provided with electric cooking schools by the Westinghouse Electric & Manufacturing Company in conjunction with the Southern Colorado Power Company. M. E. Lanning of the Denver office has been in charge with the actual instruction being given by Mrs. Clara Hunt, a domestic science expert.



Warehouse of the California Wire Company on Bryant Street, in San Francisco.

Reduction Made in Lighting and Power Rates in Seattle

Electric lights in Seattle for both residence and commercial lighting have been reduced by the City of Seattle light department. Following the city's move, the Puget Sound Power & Light Company announced similar reductions. Under the new schedule, the rate for residence and church lighting is reduced from 6 cents for the first 40 kw-hr. to 5.5 cents; next 200 kw-hr. 2 cents; all over 240 kw-hr., 1 cent. The \$1 service charge is discontinued, the minimum charge now being 75 cents per month.

Commercial lighting rates show a reduction from 5.5 cents to 5 cents per kilowatt-hour for the consumption up to 100 kw. and 1.5 cents per kilowatt-hour for all current in excess. Commercial rates are subject to the following discounts based upon the maximum demand: 1 to 20 hp., no discount; 21 to 100 hp., 12½ per cent; 101 to 250 hp., 25 per cent discount; 251 hp. and over, 40 per cent.

The water heating rate is a flat rate of \$4 per kilowatt a month. Provision is also made for special rates for current for household cooking and heating over a three-year period. The Puget Sound Power & Light's reduction corresponded closely to the new city rates.

Pelton Water Wheel Company to Erect New Building

The Pelton Water Wheel Company has acquired the property on the southeast corner of Nineteenth and Alabama Streets, San Francisco, and will erect a two-story modern factory, 150 by 200 ft., to be utilized for an office, drafting room, pattern shop, pattern storage room and pump assembly department. The total investment will represent \$500,000.

The main building, occupying the block bounded by Eighteenth, Nineteenth, Harrison and Alabama Streets, will be used for the machine shop and turbine erection departments. This will make room for the installation of a number of large capacity machine tools and other equipment and, indeed, vir-

tually double the manufacturing facilities of the company, it is said.

Present activity in the hydroelectric field, and the increasing tendency among western power companies to take advantage of local services are given as the reasons for the proposed enlargement.

Electrical Men of Los Angeles Hold Special Meeting

A special meeting of the Electric Club of Los Angeles was held on the evening of May 24, at The Elite, a Los Angeles restaurant. The purpose of the meeting was to give the members of the club more time to get together and in this way become better acquainted with each other. The committee in charge selected the evening meeting time to permit members, who were unable to attend the Monday noon lunches, to come to the large meeting.

During the evening a number of short talks were given by men of the industry in the southern California city and after this a well planned entertainment was provided for the diners. Al Morphy acted as toastmaster at the meeting.

Submarine Power Cable Is Laid Across Willamette River

The Northwestern Electric Company of Portland, Ore., has recently laid a new submarine cable across the Willamette River at Sellwood Ferry. The new cable will permit the company to serve the Sellwood section of Portland. The cable which has just been installed is a 3-conductor, 250,000-circ.mil, 13,200-volt, varnished cambric lead covered armored cable, 1,200 ft. long.

Because the company was in need of early delivery on the cable, the manufacturer was forced to furnish it in two pieces. These were spliced before laying was started and the 1,200 ft. of cable was laid in seven minutes. In laying the cable it was necessary to figure 8 one reel on the deck of the barge. The first half of the cable was laid from the figure 8 and the second from the reel, without any delay. Two tugs were used to tow the barge.

Public Ownership Candidate Is Elected Denver Mayor

Ben F. Stapleton, former postmaster of Denver and candidate of Governor William E. Sweet of Colorado, was elected mayor of Denver, May 15, in one of the most bitterly contested elections ever held in Colorado. Of interest to the electrical industry is the fact that Governor Sweet before the campaign openly announced that he would not back a candidate who did not favor municipal ownership of all public utilities.

Of the seven candidates in the race, all but two, Mayor Stapleton and D. C. Bailey, who was defeated for re-election, expressed themselves unequivocally on this point. Whereas the other candidates accepted the issue as a subject of widespread interest, the two leaders kept this plank in the background.

Whether or not the veiled treatment given this issue by Mr. Stapleton was done intentionally because of the open stand of Governor Sweet has not been determined, according to the political wiseacres of Denver.

Although three years off, decision as to possible municipal ownership will be made during the term of the recently elected mayor and this accounts for its being injected into the spring campaign. Bailey, who was defeated, openly opposed the idea of municipal ownership during his administration. Although receiving the largest number of first choice votes in the election, he was defeated by a margin in excess of 6,000 second and third choice votes.

Mayor Stapleton's platform on the subject of public utilities as advertised prior to the election provided, "The mayor should make known to the public the true facts as to the value and cost of operations of the tramway and gas and electric properties. Our home rule charter requires the submission of all questions of ownership and franchise to the people for final decision. The duty of the city administration is to intelligently carry into effect the mandates thus expressed."

Before several audiences the newly elected mayor explained his platform by declaring for "the protection of the city's interests in the operation of public utilities and purchase of such utilities as can be purchased at a price which will permit the people to operate them advantageously."

Considering the jam the Denver traction company has been in since the strike of 1920, it appears from the campaign instituted in the courts to reduce the fares,—although the company is in the hands of a receiver,—that further efforts will be exerted by the city against the other utilities, a situation of which those interests are fully cognizant.

Progress on the Skagit River hydroelectric project under development by the City of Seattle is very satisfactory, according to C. F. Uhden, chief engineer. The city has secured title to practically all of the right-of-way for the 125-mile transmission line, on which construction will begin about June 1. Plans for the north end substation in Seattle are completed, and contract will be awarded shortly.



Cable-laying barge being used by the Northwestern Electric Company to lay new submarine cable at Sellwood Ferry, Portland, Ore. The cable was in two pieces and was spliced before laying started. The figure 8 which half of the cable made up may be seen on the deck of the barge.

Central Station Merchandising and Credits Discussed

The regular quarterly meeting of the Pacific Coast Electrical Jobbers' Association was held at Del Monte, Calif., May 10-12.

In addition to the usual closed sessions, at which matters of intimate interest to the jobbers were discussed, there were two open meetings. One was devoted to credits, and one to the function of the central station with reference to the sale of electrical appliances.

S. B. Anderson, secretary-treasurer of the Pacific States Electric Company, San Francisco, read the leading paper, in which he traced the development of the theory of credits, showing its relationship to capital turnover. He used for illustration an interesting analogy to motor truck transportation by which a definite factory output was distributed in a series of stages, showing by this that continuity in manufacturing conditions was dependent equally upon capital turnover and the meeting of credit obligations, all three synchronizing to achieve commercial success.

Mr. Anderson was followed by George A. Van Smith, Jr., vice-president of the Anglo-London-Paris National Bank of San Francisco. Mr. Van Smith delivered a carefully conceived paper on the function of the bank in relation to credits. He emphasized the fact that the relation of the bank to a borrower was not that of an investor in the business, and that the borrower could not expect to do business on borrowed capital. The bank could reasonably be expected to provide the business man sufficient ready money to permit him to discount his bills, and beyond that—nothing. He stated that, generally speaking, bank credit was one of the most abused and least understood elements in business.

Mr. Van Smith was followed by W. E. Shepard, general credit manager of the Western Electric Company, New York City. He spoke of the credit aims of credit men, pointing out the aims and purposes of credit, and the type of customer from which most losses occur. According to Mr. Shepard, three factors affect the net return on the investment. The crying need of the contractor-dealer is an adequate accounting system by which he can determine monthly the net return on his investment, gross and net profit, etc., rather than wait for the end of the calendar year when it will be too late to ward off disaster. Various estimates were made as to the duration of the present prosperity wave, which was placed at from six to nine months. A warning note was sounded as to the danger of pyramiding orders.

At the meeting given over to the central station, A. E. Holloway, commercial manager of the San Diego Consolidated Gas & Electric Company, San Diego, Calif., spoke of the success that had attended the organization of round-table meetings between the central station men and contractor-dealers, in which informal discussion of mutual problems worked greatly to the advantage of both. Mr. Holloway has developed a code of ethics for contractor-dealers and also a leaflet giving average operating costs for electrical appliances

which is being distributed among consumers in his territory.

W. R. Putnam of the Idaho Power Company, Boise, Idaho, discussed the relationship between the central station and the contractor-dealer. He contrasted the volume of business done by the central stations and the aggregate sale of electrical appliances, in which the gross revenue of the former was 10 per cent less than the \$1,200,000,000 gross of the latter. It is estimated that 1923 sales of electrical appliances will be \$400,000,000 in excess of 1922, while the gross revenue to central stations will be about \$1,200,000,000. In view of the fact that the investment of the contractor-dealer is only about one-twelfth that of the central station, these figures are interesting.

Mr. Putnam emphasized the fact that the central station is the foundation upon which all electrical business is erected and that the duty of helping the contractor-dealer toward the development of sound business methods and a greater degree of prosperity for himself should fall more properly upon the jobber than upon the central station. In his opinion, merchandising activities on the part of the central station help rather than injure the business of the contractor-dealer.

R. E. Fisher, vice-president in charge of sales of the Pacific Gas & Electric Company, San Francisco, read a paper on the value of the contractor-dealer cooperation to the central station against inimical legislation. His paper will be presented in full in a later issue of the Journal of Electricity and Western Industry.

A. C. McMicken, manager commercial department, Portland Railway, Light & Power Company, Portland, Ore., said that as soon as the contractor-dealer began to realize that his interests and those of the central station were mutual, better cooperation would result. He spoke of the improvement in standards of house wiring in the last few years, directly resulting from educational movements within the various trade organizations. He put the question, "Will the contractor-dealer of this generation develop into a competent merchandiser?"

T. E. Bibbins, president of the Pacific States Electric Company, San Francisco, attributed half his company's volume of business to the contractor-dealer. Mr. Bibbins expressed the opinion that the present high cost of wiring for electrical appliances, particularly heating devices, is placing a serious stumbling-block in the path of their wider distribution.

Messrs. Bibbins, Putnam, McMicken and Fisher all feel that unnecessary restrictions imposed by municipal regulations with respect to safety devices have increased the cost of wiring unduly. Mr. Fisher added, further, that while one solution of the high cost of wiring for the future is to see that adequate wiring is done on all new homes, nevertheless there remain many hundreds of thousands of homes throughout the country which are potential users of electrical appliances but which are either inadequately wired at present, or, in some localities, not wired at all.

The open meetings were presided over with exceptional ability by Charles Wiggin of Pacific States Electric Com-

pany, San Francisco, with Albert Elliot as secretary.

Among those present were:

- T. E. Bibbins, president, Pacific States Electric Company.
- D. E. Harris, vice-president and manager of sales, Pacific States Electric Company.
- Charles C. Hillis, vice-president, Electric Appliance Company.
- W. S. Berry, sales manager, Western Electric Company.
- Earle G. Alexander, manager, Alexander & Lavenson Electrical Supply Company.
- James H. Lavenson, financial manager, Alexander & Lavenson Electrical Supply Company.
- Arthur E. Rowe, sales manager, Garnett Young & Company.
- Clarence E. Thompson, salesman, Westinghouse Lamp Company.
- W. B. Sawyer, Jr., sales engineer, United States Steel Products Company.
- Walter Seaver, manager wire department, United States Steel Products Company.
- R. A. Balzari, manager of industrial division, Westinghouse Electric & Manufacturing Company.
- R. F. Oakes, National Carbon Company.
- Ray W. Murphy, Pacific Coast manager, Westinghouse Lamp Company.
- H. B. Squires, president and manager, H. B. Squires Company.
- H. F. Yost, manager Trumbull Electric Manufacturing Company.
- Harry L. Garbutt, manager supply division, Westinghouse Electric & Manufacturing Company.
- Thomas Simpson, general manager, Majestic Electric Development Company.
- Harry H. Daley, sales and heating specialist, Majestic Electric Development Company.
- H. E. Sanderson, Pacific Coast manager, Bryant Electric Company.

The Denver Electrical Cooperative League has resumed its weekly radio matinees after a lapse of several weeks pending the renewal of a license for the broadcasting station featuring the programs. According to S. W. Bishop, the executive manager, talks by experts in the industry are being given every Friday afternoon from the station operated by the Winner Radio Corporation, of Denver.

Books and Bulletins

ELECTRIC TOY MAKING

By PROF. T. O'CONOR SLOANE.
Twenty-first edition. 250 pages, 7¼ x 5¼ in. Cloth binding, 118 illustrations.
\$1.50. Published by The Norman W. Henley Publishing Company, New York.

The book is an enlarged and revised edition of former editions of the same subject. The author has added some new material to the text and has included a few new illustrations. The text is the same character as before and handles the subject in an interesting and sufficiently detailed manner.

The book deals with the making at home of toys, electrical apparatus, motors, dynamos, etc., and explains how these can be made from materials which can be obtained at little cost. Rather detailed treatment is given to various classes of alarms, both the open and closed circuit relay-types being described.

Electrical toys are the principal topics of the book and these have been dealt with in a comprehensive manner. The book is a little too complicated for a child to use, but could be followed by an adult with ease.

Meetings

Electric Truck Day to Be Held by Development League

The Electric Transportation Club of San Francisco is planning to cooperate with the San Francisco Electrical Development League in providing entertainment at the meeting of the League which opens the Pacific Coast Electrical Association Convention. The usual meeting of the League will be postponed until Tuesday, June 19, and at that time the delegates to the convention will be guests at the luncheon.

Preliminary to the lunch, the Electric Transportation Club plans to hold a parade of electric vehicles now in use in San Francisco. This parade will advance up Market Street so that it will arrive at the center of the city about noon, thus securing attention from the largest possible crowd. It is planned to have the trucks decorated with appropriate signs telling of the economy of operating electric vehicles and other sales propaganda.

Central Station Association Is Host to Denver Club

The Denver Chapter of the Doherty Men's Fraternity was the host at the annual breakfast of the Denver Press Club, held in the Colorado city on April 29. V. L. Board, president of the chapter and general superintendent of the Denver Gas & Electric Light Company, served as the principal speaker. James C. Burger, president of the Hamilton National Bank and a director of the Denver central station, acted as toastmaster. George E. Lewis, executive manager of the Rocky Mountain Committee on Public Utility Information, was a member of the club committee arranging the breakfast.

Other electrical men taking part in the celebration were John E. Loiseau and G. W. Bixler of the Denver Gas & Electric Light Company, W. C. Sterne of the Arapahoe County Power & Light Company, S. W. Bishop and F. J. McEniry of the Denver Electrical Cooperative League and J. F. Greenawalt and J. F. Moorhead of the Mountain States Telephone & Telegraph Company.

The Los Angeles Chapter, American Institute of Electrical Engineers, recently took a trip to the Laguna Bell substation of the Southern California Edison Company, where they were informed of the transfer of the Edison system to 220,000 volts. They also inspected the Arcade substation of the Pacific Electric Railway Company and then took a trip to Throop College where they enjoyed a dinner and several interesting talks.

Extension of the power line of the Stevens County Power & Light Company from Colville, Wash., through Echo Valley and Lake City to Marble is to supply a large section of the farming land with electricity this summer. The Upper Columbia Company of Marble has contracted with the power company for not less than 200 hp.



Donner Lake, where the California State Association of Contractors and Dealers will hold its annual meeting beginning June 10. Activities such as those shown will be engaged in by the delegates.

Contractor-Dealers Assemble at Donner Lake, June 10-16

Northern California's "Electrical Dependability Caravan" numbering approximately eighty men, women and children, will leave San Francisco in automobiles, Saturday, June 9, for Donner Lake in the High Sierra, to participate in the annual convention of the California Association of Electrical

a committee from the Sacramento section of the association, which includes C. V. Schneider, chairman, J. C. Hobrecht, R. Finchley, M. P. Cannon, and D. H. McCulloch. Special arrangements are being made for the entertainment of the party Saturday night. Augmented by the delegations from the interior valley cities, the party will leave Sacramento early Sunday morning for Donner Lake.

The convention will open with a business session Monday morning. Tuesday morning's session will be devoted to discussions of cost and business stimulation methods. Wednesday morning's meeting will be devoted to committee reports and the election of officers. Thursday the entire party will visit the resorts around the shores of Lake Tahoe while Friday and Saturday will be devoted to pleasure. The plans for entertaining the delegates are most elaborate and include dancing, fishing, swimming, boating and the annual ball game. The party will return to San Francisco, Sunday, June 17.

The Columbia Valley Power Company, an organization of eastern men, controlling water rights on the Deschutes River, has opened an office in Portland, Ore., and is now doing preliminary engineering work looking to the establishment of two power plants. D. G. Fisher of Davenport, Iowa, president of the concern, is quoted as saying that the company is confident that the plants will be built and if all goes well, construction should begin within two years. The plan contemplates a transmission line across the Cascade Mountains into the industrial section about Portland.

Articles of incorporation were recently filed by the Inland Power & Light Company of Portland, Ore., capitalized at \$100,000. The incorporators are Henry S. Gray, C. Larison, and D. A. Eckman.

COMING EVENTS

- National Electric Light Association—
Annual Convention—New York, N. Y.
June 4-8, 1923
- League of the Southwest—
Conference—Santa Barbara, Calif.
June 7-9, 1923
- California State Association of Contractors and Dealers—
Annual Meeting—Donner Lake, Calif.
June 9-16, 1923
- Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923
- Northwest Electric Light and Power Association
Annual Convention—Seattle, Wash.
June 27-30, 1923
- Rocky Mountain Division, N.E.L.A.—
Annual Convention—Glenwood Springs, Colo.
Sept. 17-19, 1923
- American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Oct. 2-5, 1923

Contractors and Dealers to be held at that resort during the week of June 10-16.

This year's convention is an innovation as heretofore the meetings have been held at more conventional resorts close to the centers of population. From the number of reservations for the sessions this year, officials of the organization feel that the plan to make the convention a vacation trip is highly successful.

The party from San Francisco will be met in Sacramento Saturday night by

Personals

E. B. Criddle, formerly general agent of The Southern Sierras Power Company, has been made vice-president of that company and the Nevada-California Power Company and general agent of the Holton Power Company. Mr. Criddle was born in Tennessee. He



E. B. CRIDDLE

had an extensive preliminary training in bookkeeping, stenography, drafting, railroad clerical work and rate making, together with considerable shop work. Following this he was for some time a public accountant and real estate agent. Later he became interested in the manufacture of ice and was for a time manager of an ice plant. He was also manager of a rolling mill and superintendent of a gold reduction works. Mr. Criddle has found the experience gained in these many branches of industry of great use in the public utility field. He joined The Southern Sierras Power Company in 1911 as district manager in the Northern Division. He held this position for two years and was then made general agent with headquarters in Riverside. Mr. Criddle is an active member of the Pacific Coast Electrical Association and every year contributes to the papers of that organization.

Parker M. Robinson, formerly turbine engineer on the Pacific Coast for the Westinghouse Electric & Manufacturing Company, has recently joined Hunt, Mirk & Company, San Francisco, entering the firm as a junior partner. Mr. Robinson is a graduate of the University of Pittsburg as well as Yale University and has been connected with the engineering department of the Westinghouse Electric & Manufacturing Company for over four and a half years. In his new work, Mr. Robinson will represent Hunt, Mirk & Company who are consulting and contracting engineers specializing in steam power plants on the western coast.

H. H. Jones, president and manager of the San Diego Consolidated Gas & Electric Company, is a recent San Francisco visitor.

Warren K. Lee, of the Northeast Electric Company, Detroit, Mich., is a recent Pacific Coast visitor.

R. M. Hendrick, erecting engineer for the Pelton Water Wheel Company, passed through San Francisco recently on his way to Philadelphia to resume his work for Wm. Cramp & Sons Ship & Engine Company. For the past six months Mr. Hendrick has been in Mexico superintending the erection of two 20,000-hp. Pelton turbines at the Tepexic plant of the Mexican Light & Power Company.

F. F. Johnson has been reelected president of the Idaho Power Company. Others elected were William T. Wallace, vice-president; W. R. Putnam, vice-president and general manager; E. W. Hill, vice-president; R. B. King, general superintendent; F. J. Rankin, chief engineer; A. J. Priest, secretary, and A. E. Janssen, treasurer.

H. B. Cannon, formerly in the commercial department of the Pacific Gas & Electric Company at Newman, Calif., has been made superintendent of construction with headquarters at Modesto.

George A. Campbell, general manager of the Truckee River Power Company, formerly the Truckee River General Electric Company, was a recent San Francisco visitor. Mr. Campbell discussed the interconnection between his company's system and that of the Pacific Gas & Electric Company with officials of the latter utility.

A. C. McMicken, sales manager of the Portland Railway, Light & Power Company, is a recent San Francisco visitor. Mr. McMicken was in California to make a study of development in electric water heating. He was one of the visitors at the recent Jobbers' convention at Del Monte.

R. G. Ellis, Pacific Coast representative of the American Electrical Heater Company of Detroit, has recently transferred his headquarters from San Francisco to Los Angeles, and will conduct his business from that point.

A. E. Peat, treasurer and comptroller of the San Joaquin Light & Power Corporation, Southern California Gas Company, Midway Gas Company and associated companies, has just recently returned from a trip to New York and Washington in the interest of the various companies with which he is associated.

W. H. Aunger has recently been appointed sales manager of the Electric Corporation, of Los Angeles, jobbers and distributors of electrical supplies. Prior to Mr. Aunger's present appointment, he was salesman for the Electric Corporation in the outlying territory of Los Angeles, and his excellent work in this section gained for him his present position.

Charles P. Holmes has recently joined the Los Angeles sales organization of the Western Electric Company as appliance specialist. Prior to his present position, Mr. Holmes was connected with the Havens Electric Company of Albany, New York, General Electric distributors in that section.

L. M. Klauber, general superintendent of the San Diego Consolidated Gas & Electric Company, has been elected secretary-treasurer of the California Gas Research Council. The council is the recent outgrowth of the Gas Efficiency Committee which has been operating for several years. Among its purposes are the co-ordination of the gas activities and improvement in the methods of gas manufacture.

G. F. Egeler, mechanical engineer, formerly with the Chicago, Milwaukee & St. Paul electrification, is now connected with S. Herbert Lanyon, with offices in the Call Building, San Francisco.

Gerard Swope, president of the General Electric Company, arrived in Portland on May 21, accompanied by C. E. Emmons, vice-president of the corporation, in charge of the manufacturing operations. They are on a tour of inspection of the company's offices on the coast and are also investigating business conditions throughout the country.

Jake Fisher, president of the Denver Association of Electrical Contractors & Dealers, has returned to Denver after several weeks at Albuquerque, N. M.

Harry G. Holabird, manufacturers' agent, Los Angeles, and representative of the Ohio Brass Company, Crouse-Hinds and other electrical manufacturers, has just recently left for the East to visit the factories of the various companies that he represents.

E. A. Shepard, general credit manager of the Western Electric Company of New York, is a recent Pacific Coast visitor in the interest of his company. Mr. Shepard attended the Del Monte Jobbers' convention and took part in the program.

Alex Hibbard, secretary-treasurer of the Denver Association of Electrical Contractors and Dealers, after an extensive eastern trip in the interests of his organization and those manufacturers whom he represents, has returned to Denver.

H. P. Slocum has recently joined the sales force of the Hawaii Electric Company of Honolulu.

E. O. Shreve, general chairman in charge of arrangements for the annual convention of the Pacific Coast Electrical Association, to be held at the Fairmont Hotel in San Francisco, June 19 to 22, will be responsible for the programming of events at that gathering. Mr. Shreve, who is San Francisco manager of the General Electric Company, is well fitted by many years of association activity to undertake this task. An extensive program of entertainment and recreation has been arranged in addition



E. O. SHREVE and MRS. SHREVE

to the usual convention business. Two of the special features of this year's convention program for which Mr. Shreve is responsible are the Western Development Conference and the "Poly-phase Pageant of Progress" in which there will be two hundred costumed participants.

E. E. Brazier, sales manager of the Capital Electric Company, and L. B. Johnson of the Salt Lake office of the General Electric Company, have returned to Salt Lake City after an extensive trip through the East.

H. H. Manny, Seattle manager of the Baker-Joslyn Company, recently spent several days in San Francisco on business.

J. B. Carter, former district manager at Corcoran for the San Joaquin Light & Power Corporation, has been made agricultural sales engineer for the company with headquarters in Fresno. His place at Corcoran has been taken by Fred C. Carroll, who was formerly assistant manager at Merced.

General George W. Goethals, noted engineer, recently spent several days in Colorado Springs, Colo., making a survey of the properties of the Colorado Springs Light, Heat & Power Company in connection with the fight that company is making for a renewal of its franchise.

J. W. O'Brien, line and service superintendent of the Utah Power & Light Company in the Ogden district, has been promoted to division manager at Park City, Utah.

George Potts, for many years connected with the American Telegraph & Telephone Company in various parts of the United States, has been appointed city electrician of Modesto, Calif.

Arthur Kempston, formerly Los Angeles district manager of the Majestic Electric Development Company, has just recently become associated with Chas. T. Phillips as a partner in the Charles T. Phillips Company, consulting engineers of San Francisco. This company has recently opened offices in Los Angeles in the Roberts Building, with Mr. Kempston in charge, and is now ready to render special service to architects and others interested in building operations, and to prepare plans, reports, designs, specifications and estimates on electric installations of all types, heating and ventilating, illumination, plumbing and steam



ARTHUR KEMPSTON

plants. Mr. Kempston was for a number of years city electrician of San Francisco and later was a field representative of the California Electrical Cooperative Campaign. He is a very active member of the Electric Club of Los Angeles, being chairman of the membership committee.

C. M. Clark, chairman of the executive committee of the Portland Railway, Light & Power Company, recently spent two weeks in Portland going over the properties of the company which he heads. Mr. Clark's headquarters are in Philadelphia.

Frank E. Russell, general manager of the Tucson (Ariz.) Gas, Electric Light & Power Company, subsidiary of the Federal Light & Traction Company, died recently. Mr. Russell had been connected with these utility properties for 31 years and was an active figure in the utility affairs of the Southwest.

Dr. Schuyler Skaats Wheeler, pioneer electrical manufacturer and inventor, past president of the American Institute of Engineers, and the originator of the engineering "Code of Ethics," died in New York City on April 20. Dr. Wheeler was one of the organizers of the Crocker-Wheeler Company, and was the inventor of the electric fan motor. He was one of the foremost figures in the electrical industry.

W. R. Putnam, vice-president and general manager of the Idaho Power Company, is a recent California visitor. Mr. Putnam also attended the recent Jobbers' convention at Del Monte.

A. E. Holloway, sales manager of the San Diego Consolidated Gas & Electric Company, attended the recent Del Monte convention of the Jobbers' Association and took part in the discussions.

J. H. Parker, head of J. H. Parker & Company, Parkersburg, Pa., manufacturers of porcelain, is a recent Pacific Coast visitor. Mr. Parker was a visitor at the sessions of the Pacific Coast Jobbers' convention at Del Monte.

F. C. Plueger, of the Atlas Electric Sign Corporation, New York City, is a recent Pacific Coast visitor.

M. G. Soldini of the Schenectady works of the General Electric Company, is a recent San Francisco visitor.

Harry Byrne, manager of the North Coast Electric Company, Seattle, attended the quarterly meeting of the Pacific Coast division of the National Electrical Supply Jobbers' Association at Del Monte recently.

Henry C. Peebles, formerly with the Puget Sound Power & Light Company and for several years attached to the engineering division of Stone & Webster, has gone to Indianapolis, Ind., where he will be engaged in the construction of a 75-mile steel tower transmission line from Indianapolis to Terre Haute.

C. S. Anderson, formerly electrical engineer for the Duquesne Light Company, Pittsburg, Pa., is now connected with the Electric Bond & Share Company, New York.

R. C. Lanthier, vice-president and general manager of the Sangamo Electric Company, Springfield, Ill., spent several weeks on the Pacific Coast recently, spending several days in both San Francisco and Los Angeles.

R. W. Coblentz has taken over the Pacific Northwest territory for the Square D Company and has established headquarters in Portland. He will work under the direction of E. S. Conrad of San Francisco.

H. W. Coombs, sales representative of the Bryant Marsh Division of the National Lamp Works, spent two weeks in Salt Lake City recently in the interests of his company.

Frank D. Fagan, who has been associated with Thomas A. Edison as vice-president and general manager of the Edison Storage Battery Company for the past three years, has been selected to go on a special mission to Japan for the International General Electric Company. Mr. Fagan has risen up through the ranks of the General Electric Company, and is the originator of many remarkable selling ideas in connection with the sale of incandescent lamps. He originated "Edison Day" which has since taken on a national character. It was through his efforts that Thomas A.



FRANK D. FAGAN

Edison was induced to come to the Panama-Pacific International Exposition in San Francisco, in 1915. Mr. Fagan sailed on May 17, and will stop at Honolulu en route to Japan on company business. Mr. Fagan is well known in the West, having spent the first years of his connection with the electrical industry in some of the western states.

R. M. White has been appointed service station manager of the Los Angeles station, Edison Electric Appliance Company. Mr. White has been in the employ of that company for the past two years and succeeds H. E. Corbett, deceased.

Ross Hartley, president and manager of the Electric Corporation, jobbers and distributors of Los Angeles, is now in the East visiting the various factories which his company represents in this section.

Obituary

Charles A. Kilbourne, president of the Kilbourne & Clark Manufacturing Company of Seattle, died at Nyack, N. Y., recently. Mr. Kilbourne was a pioneer of Seattle, having established the Seattle Electric Company which was taken over by the Stone & Webster interests. In 1900, he organized the Kilbourne & Clark Manufacturing Company of which he was president. This company was the pioneer in the Pacific Northwest in the development of wireless and radio telegraphy equipment manufacturing, and held important contracts for wireless apparatus for government ships during the war.

Manufacturer, Dealer and Jobber Activities

Harold Danenburg, of Roswell, N. M., has recently purchased a half interest in the Bonney Electrical Company of that city. Mr. Danenburg was formerly with the L. F. Woodhead Electrical Company.

The Westinghouse Electric & Manufacturing Company has recently placed on the market a new device for indicating the temperature of oil in distribution transformers. The new device is known as a transformer thermal indicator. The new indicator may be used on any oil-insulated electrical apparatus and is designed to indicate accurately actual temperatures as well as maximum temperatures. The device can be attached to transformers with a minimum of labor.

The electrical fixture store of Stanley Lutz, formerly located at 200 Chamber of Commerce Building, Portland, Ore., has been moved to a large ground floor storeroom at 108 Third Street. This gives Mr. Lutz greatly improved store-room and factory facilities. B. E. Lyman, expert metal finisher, who recently arrived from the East, has been added to the personnel of the store. He is creating a number of new finishes for appliances turned out.

The National Electric Company of Butte, Mont., has recently added an art department to its store. In the new department the company handles an attractive and up-to-date line of garden pottery shades and shields as well as other ornamental fixtures. The part of the store devoted to the fixture department is so arranged as to permit purchasers to simulate conditions in their own homes while looking at new fixtures. Mahogany and old ivory wood-work makes the new art department an attractive addition to the store.

The Roller-Smith Company, New York, has recently published Bulletin No. 30 which describes the new triplex ammeter that the company is just putting on the market. The new ammeter is designed for taking simultaneous readings in each of the three phases of a three-phase high tension metering circuit. The new ammeter can be used in low tension three-phase circuits in connection with suitable current transformers. According to the booklet just published the triplex ammeter has all the advantages of three individual ammeters, as any of the three mechanisms can be removed without interruption of the circuit.

The City Electric Company is a new store recently opened in Sheridan, Wyo. R. L. Cooley is the manager of the new concern which will handle a line of electrical fixtures and appliances. The store is located at 18 South Main Street.

The Square D Company, Detroit, Mich., has developed a new device to make safety switches additionally safe. The new device encloses the live terminal, entering the safety switch, in a protective cover. This cover has a narrow slot large enough to admit the switch blade but too small to permit a finger to slip through.

The Easiest Way Manufacturing Company, Sandusky, Ohio, has announced a new oscillating-type electric washing machine. The new machine has a capacity of six sheets and the tub is heavy tin-lined copper. A swinging reversible wringer is attached to the machine.

The D. & E. Electric Company has opened a new store at 5108 Geary St., San Francisco. F. J. Dolly and F. J. Egan are the owners of the new establishment which will deal in electrical fixtures and Edison mazda lamps.

The American Spiral Pipe Works, Chicago, Ill., manufacturer of steel pipe fittings, has recently published Catalog No. 22. This catalog describes in detail the spiral pipe manufactured by the company, giving illustrations of the company's products.

Altorfer Brothers Company, Peoria, Ill., has recently put on the market an electrically heated and operated ironer which is designed for the small family. The new all-electric ironer is 26 in. wide and the cost of installing it should be very small. The heating element is rated at 1,500 watts.

The Electric Corporation of Los Angeles has leased a large part of a building at 321 Occidental Avenue, Seattle, Wash., and will conduct a general electrical business in the location. Extensive alterations to the building are being made.

The Edwin F. Guth Company, is the name of a new St. Louis, Mo., company which has been formed to succeed the St. Louis Brass Manufacturing Company and the Brascolite Company. The interests of both of these latter companies have been unified under the new company. The St. Louis Brass Manufacturing Company was organized in 1902 and the Brascolite Company was formed to market Brascolite products in 1913. The company which took over these other concerns, which were both headed by Edwin F. Guth, will be presided over by the same man. No change in policy or personnel is reported.

Benjamin Electric Manufacturing Company, New York, has published Bulletins No. 705 and 708 which describe Benjamin-Starrett dead front panel boards and Benjamin outlet box fittings. Illustrations of the equipment are presented in each bulletin.

The General Electric Company has prepared for distribution, to its customers, two indexes which contain a full listing of the bulletins issued by the company. The indexes give a listing of all bulletins of supply parts, descriptive bulletins and sheets that have been prepared for distribution. From these indexes a customer can secure the number of any piece of literature that he desires and can request copies by giving the number of the publication. A list of sales offices is also included.

The Bluebird Electric Shop, Tacoma, Wash., has moved to a new location at 1105 Broadway in the Puget Sound city. The new quarters are much larger than those recently vacated. D. D. Flenner has been appointed sales manager of the concern.

The P. A. Geier Company of Cleveland, Ohio, has been holding a series of group conferences with its salesmen instead of having the usual annual sales convention. During the conferences the salesmen were told of the workings of the credit department and efforts were made to give the men a broader background of understanding of the business.

The Edison Electric Appliance Company, has been marketing for some time a line of apartment house electric ranges. These ranges are small in size and are well adapted to use in small kitchens. No nickle is on the new type ranges and all the metal is finished in plain black japan enamel.

The Master Light & Fixture Company of Auburn, Wash., has been organized with a capital stock of \$40,000. The officers are: A. F. Netzel, president; A. F. Anderson, vice-president and factory sales manager; F. T. Jenks, vice-president and secretary.



ART'S FOLLIES

The above caption was suggested by our intrepid staff camera man who secured this picture at enormous expense and only after great personal risk at the annual convention of the California State Association of Electrical Contractors and Dealers, at Santa Cruz in 1922. We offer it as indisputable evidence that "Art" Rowe, besides being one of the most popular members of the electrical industry in California, is also there with the ladies.

Trade Outlook

San Francisco

General business conditions in San Francisco continue to be good and a general feeling of prosperity is prevalent. Conservative financial houses are issuing warnings against the dangers of the present upward price trend and are advising business firms to advance slowly. Commerce is active and it is the desire of the conservative bankers to prevent the recurrence of the war-boom depression and collapse.

Production and sales continue to keep ahead of 1922 records. April reports show that there was an advance of about 20 per cent over last year's production and sales. Steady demands have forced prices of manufactured goods to a higher point as have the scarcity of some raw materials and labor wage increases. Turnover in products is keeping pace with production in all lines.

The building boom has brought in the last two months a rise in prices of materials of about 15 to 20 per cent. This has resulted in the deferring of the building of new apartment houses. Construction of homes continues at a rapid rate.

The electrical industry is profiting by the building program and is in a good position. Most of the new homes being erected are being wired in the most modern manner and many follow closely wiring plans of the electric homes displayed in the region.

Seattle

The lumber industry in the Northwest has been mildly disturbed during the past three weeks by an incipient strike in the logging camps of the Puget Sound district, fostered by the I. W. W. interests. The strike was not a success, and most of the workers who walked out have gone back to their jobs. A few camps were closed, others were somewhat crippled, but no serious losses to the industry resulted in the strike fiasco. Lumber demands continue very active, and lumber manufacturing plants are working to capacity. Cargo shipments have been very heavy.

Seattle retail trade has continued in good volume, in practically all lines of merchandise. Electrical men report that the sales of all household appliances have held up satisfactorily, with a special run on appliances suitable for gifts. Electric ranges are showing considerably increased sales volume, especially for new apartment structures. Radio sales have dropped off, and interest in this branch of electrical business seems to have waned considerably.

Prices are steady, and collections continue fairly good.

Building activities in the city show no sign of decrease, rather there is a steady increase in the number and value of permits. Figures compiled by an authoritative realtor indicate that there are now twelve million dollars worth of building work under way in the business

district alone. In addition, an unprecedented number of new houses are under way or projected for the spring and summer. Of interest to the large builders is the statement that on May 12, the transcontinental railroads announced a deep cut in westbound export rates on iron and steel articles from Chicago.

Los Angeles

Building operations in the city of Los Angeles for the first week of May show the issuance of 1,600 permits with an estimated valuation of \$5,020,360, while for the same period in the month of April, there were 1,578 permits issued, with a valuation of \$5,115,000. From these figures it is apparent that the building for May will equal, if not exceed that for the month of April. Building during the month of April exceeded that of all other months for the present year with the exception of March.

Bank clearings for the period May 5 to 11 inclusive, show a total of \$133,076,344 while for the corresponding period in 1922, clearings amounted to only \$98,085,645. This shows an increase of this year over last of approximately 35 per cent.

Manufacturers and wholesalers of electrical apparatus and supplies report business increasing in volume with the only drawback being due to delays in shipment and corresponding long deliveries. The retail business is holding up well though the sale of radio apparatus has fallen off to some extent, however this is to be expected with the approach of hot weather.

Denver

Building operations as represented by residence construction continue at a record rate. Permits issued during the past month exceed a million and a quarter dollars. There seems to be no difficulty in financing and unless the unforeseen occurs, it is generally believed that the building program in this territory will not slacken until fall.

Next to Kansas City, thus far this year, Denver has done more building than any other city in the tenth federal reserve district. In savings accounts Denver leads all other cities in this district. Banks in the agricultural districts report an improved condition which indicates that fair crop prices will materially re-establish business in the rural regions.

Denver is fourth from the top in thirty-eight cities where employment conditions have improved and a digest of the district according to government reports shows an increasing demand for skilled labor, mechanics, and farm hands. Clerks and office workers are not faring so well.

Central station improvements continue throughout the district. Wire and transmission materials seem to be most in demand. Jobbers report stocks in fair shape with a dull movement of

appliances. In the southern part of the state, electric ranges are moving in volume. Radio trade is slow thus resulting in temporary price cutting campaigns. Commercial lighting units are being pushed successfully. Collections are still slow.

Salt Lake City

General business improvement in this section, and particularly in Salt Lake City, has been pronounced during the past few weeks. A number of new industries are contemplating locating here, and several of them are now in operation. The industrial department of the Salt Lake Chamber of Commerce, reports improvements in this line that will amount to about \$2,000,000 per year in payrolls and will employ about 1,200 additional men and women. This is in addition to new projects which have not yet assumed definite form.

With the farmers, indications are good for at least fair prices this year, and there is a spirit of optimism in the agricultural districts. Constantly increasing activity in metal mining and in building is creating a heavy demand for labor, both skilled and unskilled. An extensive program of highway construction is now under way, which will involve an expenditure of about \$2,500,000.

Electrical jobbers report conditions as continuing to show improvement, with this year's business to date considerably in excess of that of last year's corresponding period. Increased industrial activity is resulting in greater use of electrical energy; and in the homes also there seems to be a tendency toward the more extensive use of electrical appliances.

Credit conditions and collections continue to improve.

Portland

The principal factors in the business life of Portland and vicinity show a very healthy condition. Business generally is good. In the lumber industry, which stands first of all in the northwest, production continues at about 12 per cent above normal. Production of logs and lumber were reduced slightly during the first two weeks of May by a half-hearted strike attempted by the I. W. W. By the middle of the month, however, conditions had returned to normal. The small effect of the I. W. W. was probably due to the strong organization of loyal men known as the 4 L's (Loyal Legion of Loggers and Lumbermen).

Lumbermen are expecting the present rush of orders to continue.

Although throughout the country generally, including some of the Pacific Coast cities, the totals of the building permits for April were considerably less than for March of this year, Portland was able to show a gain of 45 per cent. Home building is going on in every part of the city, and this is in spite of high costs of material and labor shortage.

The condition of Oregon's wheat crop on May 1 was rated at 95 per cent normal. It suffered very slight winter damage. The same holds for the live stock in the state. Spring weather was very favorable to the planting of spring crops.

Construction News

Bridges

Calif., Pasadena—W. P. Earle, city engineer and superintendent of streets, has ordered the preparation of plans for the new \$100,000 reinforced concrete bridge to supplant the present condemned bridge across the Arroyo Seco at Linda Vista Ave.

Calif., Santa Barbara—County Surveyor Owen H. O'Neill has been instructed by county supervisors to prepare plans and specifications for a bridge across the Santa Ynez River, on the Lompoc-Harris station road. The construction is conditional upon the voting of \$215,000 for paving a 7-mile stretch of roadway in the Lompoc permanent road improvement district.

Wash., Ellensburg—The Union Bridge Company of Portland was the successful bidder for the contract to build a new steel bridge across the Yakima river between Cle Elum and South Cle Elum with a bid of \$49,897. This contract includes the approach on the Cle Elum side of the river but not the concrete approach on the South Cle Elum side.

Wash., Seattle—The Washington Engineering Sales Company, here, received contract for furnishing steel for a proposed 17-ft. combination steel bridge to be built near Nome for the Alaska Railroad Commission. Contract provides for approximately 27 tons.

Wash., Seattle—By a narrow margin, the bond issue of \$500,000 for erection of the Montlake-Stadium bridge, connecting the University district with downtown business streets, was passed recently.

Wash., Seattle—The King County Commissioners have appropriated \$40,000 to be used in constructing the proposed bridge across Lake Washington from Barnaby Point to Enatai Point, connecting Mercer Island with the east shore of the lake.

Highways

Calif., Visalia—J. A. Dowling, of San Francisco, was awarded contract for the surfacing of the Lindsay-Tulare highway, a two-mile stretch, on a bid of \$12,151.60. T. A. Hanrahan, of Fresno, received contract for a section of Dinuba highway on a bid of \$53,545.72.

Calif., Oroville—Chas. L. Ellis was awarded contract for construction of west Liberty road, on his bid of \$10,471.

Idaho, Boise—The state department of public works has awarded to J. C. McGuire of Boise the contract for the construction of 6.78 miles of paving of the Yellowstone Park highway in Bingham County. The cost of the project will be \$211,787.27, which will be borne by the federal government, state and county. The construction will be bituminous concrete on a gravel foundation.

Idaho, Boise—A contract has been let for 5.5 miles of the Coeur d'Alene-Yellowstone trail in Shoshone County at a cost of \$60,000. This is a federal aid project. Shoshone County is planning to complete the highway across the county, a distance of 38 miles.

Idaho, Boise—The state department of public works has let a contract for the surfacing of part of the North and South highway between Cottonwood and Lawyers Canyon in Idaho County. The highway will be surfaced with crushed rock for 1.22 miles, the contract being awarded to the General Construction Company for \$46,002.

Mont., Helena—Contracts for approximately \$550,000 worth of highway building on the

Blackfeet Indian reservation will be let by the state highway commission early in June, now that the right-of-way matters have been settled. George W. Lannstrum made the announcement. Fully 100 per cent federal funds will be used for the building of this highway which will be about 55 miles of road. The road will extend from Birch to Glacier Park.

Ore., Salem—Highway contracts have been let as follows: 24 miles of construction work on the Eugene-Florence road through the Siuslaw national forest of Oregon was awarded to Guy F. Atkinson of Portland on his bid of \$366,835. The project will include clearing, grading, crushed rock and gravel surfacing and bridge construction. The contract for 7.9 miles of crushed rock and gravel surfacing on the McKenzie highway in the Belknap section of the Cascade national forest was awarded to the Motor Investment Company of Portland for \$32,210. The contract for 9.75 miles of clearing and grubbing work on the Olympia highway between Bogachiel and Hoh River was let to Tilenda, Slimkoski and Early of Wilkeson, Wash., on a bid of \$58,678 with explosives furnished by the contractor.

Wash., Walla Walla—On a bid of \$32,792 H. L. Wilson was awarded the contract for the construction of 9.2 miles of macadamized highway on the lower Waitsburg road between Bolles Junction and Dry Creek.

Wash., Seattle—Contract for paving 16th Avenue S.W. highway known as the White Center road, has been let by King County commissioners to Florito Bros., Seattle, on their bid of \$31,400. The road is one mile long, and one-course concrete, 20 ft. wide and 6 to 8 in. thick will be laid.

Wash., Olympia—State highway commission will receive bids until June 12, for the following work: Grading, graveling 5 miles of Sunset highway, King County, Falls City to Snoqualmie; graveling 15 miles of the Ocean Beach highway, Pacific County, between Palix and Nasel; Olympic highway, Grays Harbor County, paving four small gaps between Montesano and Aberdeen, and until June 25, for grading, draining and surfacing with crushed rock, 6 miles of Navy Yard highway, Mason County, between Union City and Holyoke.

Irrigation Projects

Ariz., Phoenix—Plans for the formation of a project to be known as the Roosevelt Irrigation District No. 1, were completed recently before the Maricopa County supervisors. The project comprises the Carrick and Mangham Agua Fria Lands & Irrigation Company properties, approximately 20,000 acres, which with the holdings of 115 individuals total 39,000 acres. The water supply will be obtained by diverting the unappropriated and flood waters of the Gila and Agua Fria rivers, installation of pumps within the district and from surplus waters of other irrigation districts. Directors are: C. Rodney McDonald, S. Carl Miller and T. J. Roberts.

Calif., El Centro—Chief Engineer R. S. Carberry of the Imperial Irrigation District, states work will be started soon on construction of a large drainage canal in the Westmoreland district. The survey will be completed in 60 days. Work, to be done under the recent \$7,500,000 bond issue, will be started not later than Sept. 1.

Idaho, Boise—The voting of the \$2,750,000 bond issue and approval of the contract with the reclamation service by the districts, includ-

ing the North Side Twin Falls and the South Side Twin Falls projects, will make available \$10,000,000 for the construction of the American Falls reservoir. Lands in the American Falls reservoir district comprise approximately 500,000 acres, virtually all now occupied and farmed. The present town of American Falls is to be submerged with the construction of the reservoir and will be relocated on higher lands.

Mont., Helena—Award of the construction contract of the Re-Lodge-Rosebud irrigation district to J. S. Haley of Bozeman for \$217,000 was approved by the state irrigation commission.

Mont., Great Falls—When the present government plans are carried out 398,000 acres of the Indian reservation in northern Montana will be put under irrigation. On the Flathead reservation 138,500 acres will be irrigated; 107,500 acres on the Blackfeet reservation and 152,000 on the Fort Peck reservation are to be watered.

Nev., Yerington—The contract for building of the Bridgeport dam on the east fork of the Walker River has been awarded to C. H. Hill of Reno by the Walker River irrigation district for \$153,400. Materials are to be furnished by the district. Work is to start at once.

Ore., Albany—Storm sewers are planned by the city to drain 436 acres and to cost approximately \$55,000. The firm of Stevens & Koon of Portland are the engineers in charge. The sewer is proposed to be 30 ft. deep at the river end and from 10 to 14 ft. deep at the end of the branches. The lateral sewers will be built at the expense of the property owners but the main line will be built entirely by the city.

Wash., Walla Walla—Immediate construction of the wing dam on the north bank of the Snake River is now permitted, upon word received from O. C. Merrill, executive secretary of the Federal Power Commission, by Harry Phelps, manager of the Burbank irrigation district and by Dr. J. W. Summers, representative of the fourth congressional district. Lumber and material for the dam are ordered and construction will begin as soon as the river recedes. The dam will be in operation this year, thus saving, said officials of the district, costs of about \$30,000 for power annually. The pumping plant and the water right will increase the value of approximately 9,200 acres.

Wash., Olympia—State division of hydraulics, Marvin Chase, supervisor, has granted application for appropriation of the waters of the Klickitat River for a big irrigation project to be constructed by the Grand Dallas Irrigation Canal Company. The project will comprise 5,190 acres, and is estimated to cost \$300,000.

Power Plant Equipment

Wash., Olympia—The Olympia Light & Power Company is making extensive changes in its lines and plant. The trolley wires will be supported from buildings instead of from poles and a new 100-hp. generator will replace the old 60-hp. machine. Two new water wheels, each capable of developing 1,000 hp., and a \$5,000 control switchboard will be included in the new improvements.

Power Projects

Ariz., Douglas—A power plant costing in the neighborhood of \$250,000 is to be constructed in Cananea by the Pedrazinis for the Las Chispas mine, near Arizpe, according to information given Alfred Paul, who has just returned from that district. A corps of engineers is now surveying for the transmission line.

Wash., Walla Walla—Surveys have been completed, and actual construction work will be under way shortly on the high tower transmission line of the Pacific Power & Light Company, extending from Kennewick to Pendleton, and on down the Columbia River to the plant at Hood River. The new line will carry 60,000 volts, and approximately \$350,000 will be spent in the improvement.

Railways

Calif., Bakersfield—Southern Pacific Railway has been authorized by Interstate Commerce Commission to construct a 21-mile road starting 7 miles east of Bakersfield from the main line of the Southern Pacific and entering the Arvin and Weed Patch districts, 22 miles southwest of Bakersfield. Estimated cost, \$500,000.

Calif., Mojave—Utah Construction Company, Phelan Building, San Francisco, was awarded contract by Southern Pacific Railway for the construction of 12-mile second track from Mojave, Kern County, to Camerson, Kern County. Work involves 85,000 cu. yd. excavating. Work in charge of engineering department, San Francisco.

Mont., Great Falls—Nearly \$2,500,000 will be expended in Montana this year by the Great Northern Railway Company for new construction, repairs and replacements, according to President Ralph Budd, who with a number of other officials of the road stopped in Great Falls, on his western inspection trip. The improvements to be made in Montana in 1923 include 19 miles of new double track between Java and Nyack, to cost \$1,500,000; enlargement of engine facilities, shops, terminals, and car repair depots at Great Falls, Whitefish, Cnt Bank, Troy, Rexford and Havre; relaying track, replacing bridge trestles and culverts, and placing concrete linings in tunnels.

Utah, Ogden—The Utah Construction Company has closed a \$6,000,000 contract with the Southern Pacific Railroad Company of Mexico for the construction of trackage between Tepic and Laquemada. This link is part of the line which will connect Nogales with Mexico City via the West Coast.

Street Lighting

Calif., Long Beach—C. W. Sparks, 457 S. Lake St., Los Angeles, was the low bidder and was awarded contract at \$19,945 for constructing an ornamental lighting system on Anaheim St. from American Ave. to Daisy Ave.

Calif., Los Angeles—H. H. Walker, 1800 W. 12th St., submitted low bid to board of public works at \$27,861 for constructing ornamental lighting system in 16th St. between Figueroa and Hoover Sts.

Calif., Anaheim—Street paving contracts involving the expenditure of more than \$127,000 were awarded by the Anaheim city council for work on boulevards in Mills Park, on Helena, Zeyn, Walnut, Sycamore, Citron and West streets and on several alleys in the business section of the city. The Griffith Paving Company was awarded the contract for all work except that of paving the alleys, which will be done by the Edwin B. Garretson Company of Long Beach.

Calif., Sacramento—City improvement bonds aggregating \$1,172,000 were approved at the recent election, providing for the removal of Y-street levee, street improvement extension of fire and police alarm systems, Sixteenth-Street subway, boulevard paving, levee revetment work, extension of water mains, sewer extension, increase in fire equipment, auditorium, garbage plant, and Twelfth-Street subway foot-path.

Ore., Portland—The city paving plant was the low bidder on all street paving projects, and made a clean sweep of the contracts. Nine projects totaling \$55,246 were awarded.

Ore., Roseburg—The contract for the installation of the city's new street lighting system was let to Harold Hudson, local electric dealer. Roseburg's present street lights are to be scrapped and a complete new system installed. The new type will be a single globe and 400-cp. lamp on a 13-ft. pole. The installation will cost the city \$10,800.

Utah, Ogden—The Ogden city commission has awarded to the Union Construction Company the contract for the paving of the ten blocks

of district No. 141 with 5-in. concrete base and 2-in. black top at \$116,189. The work upon the district will start at once, according to the announcement of W. E. Roche, general manager of the company.

Streets and Sewers

Wash., Seattle—Contract for constructing a tunnel in First Avenue South, under the Duwamish Waterway, has been awarded to R. L. Spargur, Colman Block, for \$107,582. Work involves sinking shaft 137.5 ft., driving tunnel 400 ft.; shaft lining, 400 cu. yd.; tunnel lining, 500 cu. yd.

Wash., Seattle—Contract for sewers in East Marginal Way District has been let to F. N. Badolato, Seattle, on his bid of \$124,321. Work involves laying approximately 22,000 ft. of clay sewer pipe, 12 in. to 36 in. in size.

Wash., Seattle—Only one bid for sewers in Brandon Street, et al, submitted, that of F. N. Badolato, at \$70,984 for clay and \$69,683 for concrete pipe. Bid was rejected and new bids will be called; engineer's estimate, \$54,965.

Wash., Aberdeen—Hankell, Hegg & Company were awarded the contract for the paving of Alder Street on a bid of \$29,980.

Waterworks

Calif., Yuba City—At a recent election held, bonds totaling \$40,000 carried for water works extensions and care of paved streets, the waterworks extension bonds of \$32,000 going through without a dissenting vote.

Calif., San Francisco—Of bids submitted for furnishing pipe for the 20-mile conduit from Irvington, Alameda County, and Crystal Springs Lake, San Mateo County, the Western Pipe & Steel Company submitted the lowest at \$19.72 per foot. On this basis it is estimated that the cost of laying the conduit will be about \$2,235,000, which is approximately \$50,000 below the estimated cost. Contract was awarded by the San Francisco board of public works.

Ore., Portland—Preliminary steps are to be taken for the construction of the third conduit from the Bull Run head works to the city. This line will be 30 miles in length and will follow a different route from the other two lines. It is probable that Commissioner Mann will advertise for bids by July 1. A rough estimate places the cost at \$1,000,000.

Wash., Enumclaw—At a recent city election, a bond issue of \$100,000 for purchase and improvement of a municipal water system was passed by the voters.

Wash., Camas—The city council recently purchased from the Camas Water Company the existing water system, and will immediately expend \$100,000 in improvements and extensions to the system. Work includes laying eight miles of cast iron pipe; a small diversion dam and intake; small additional city reservoir and improvements to the distribution system. Plans will be completed and ready for bids in about 30 days. Stevens & Koon, consulting engineers, Spalding Building, are in charge of the work.

Wash., Pe Ell—At a recent city election, it was voted to purchase and improve the water system now operated by the Washington Pipe & Foundry Company. Bonds in the sum of \$30,000 were voted for the purchase.

Wash., Tacoma—City water department will expend \$72,000 in replacing with iron mains the wooden mains in South J. Street district.

Miscellaneous

Calif., Merced—Hunt Engineering Company, Kansas City, has the contract to erect a cement plant on property along the Merced River, at the mouth of Jenkins Gulch, for Yosemite Cement Co., composed of middle-west men, who will expend approximately \$1,000,000 on present undertaking. The purchase of the line output has been contracted for by the Agricultural Lime & Compost Co., American National Bank

Building, San Francisco. J. E. Monroe is one of the officers. The cement company has secured 1,500 acres in the San Joaquin Valley, additional to the Merced River holdings.

Buildings (Industrial)

Calif., San Francisco—Preliminary work on the construction of two additions to the present plant of the American Can Company on Third Street, between 20th and 22nd Streets, will start at an early date. The estimated cost is \$1,000,000. One building will be devoted to manufacturing and storage and will be built on a lot 200 by 225 ft. It will be a two-story reinforced concrete structure. The other will be a three-story office building on a lot 80 by 180 ft. The general factory offices of the company's plant will be located here. Provision is also being made for a cafeteria and locker rooms for employees. C. G. Preis is chief engineer of the company.

Calif., Los Angeles—Arthur Walker, 1335 E. Adams St., has had plans prepared and will erect a factory building on Traction Ave., near Hewitt St., for himself. It will be 2-story, 50 x 140 ft., brick walls, composition roofing, cement and wood floors, metal skylights, steel sash; \$20,000.

Calif., Los Angeles—Joseph F. Rhodes, 415 Central Building, has the contract to erect a 1-story factory building on Newton Street, near Alameda St., for the Tropical Preserving Co., 2333 Enterprise St. Brick construction, 70 x 120 ft., composition roofing, metal skylights, cement floor; \$15,000.

Glendale, Calif.—The Rogers Una-Drive Motor Truck Co., H. C. Powell, treasurer and general manager, has taken a 98-year lease on 9 acres near Colorado Blvd. and San Fernando Road, Glendale, where it expects to begin construction immediately of the first unit (about 150,000 sq. ft.) of a large motor truck factory. The lease was negotiated with the Roy L. Kent Company, 130 S. Brand Blvd., Glendale, which will probably handle the architectural and engineering work.

Calif., Huntington Beach—California-Pacific Textile, Inc., with a capital of \$1,500,000, will build a 10,000 spindle cotton mill for the manufacture of auto tires, cord, fabrics and other similar products. W. A. Golden, formerly of Providence, R. I., is president and Thomas Talbert, Huntington Beach, chairman of the board of supervisors of Orange County, is one of the directors.

Calif., Los Angeles—Architect John M. Cooper, 320 Marsh-Strong Bldg., is preparing plans for the first unit of the class A warehouse to be erected on McGarry St., between 8th and 9th Sts., for Ray H. Arnold. It will be 5-story, 135 x 220 ft., reinforced concrete construction, plaster exterior, composition roofing, steel sash, metal skylights, sprinkling system, steel rolling doors, 4 freight elevators; \$400,000.

Calif., Los Angeles—Architect W. L. Schmolle, San Francisco, is preparing plans for a 3-story class A warehouse, to be erected at 15th Street and Grand Avenue for Chanslor-Lyon Company. Noice & Merrill, 1326 Washington Building, have been commissioned structural engineers. Reinforced concrete construction, 3-story and part basement, dimensions 70 x 170 ft., mezzanine floor, concrete exterior walls, composition roofing, 2 freight elevators, steel sash, steel rolling doors, ornamental iron, wire glass; \$100,000.

Idaho, Boise—A concrete warehouse is to be erected for the W. P. Fuller Company in this city at an estimated cost of \$100,000.

Ore., Portland—Portland business men under the direction of the Industries department of the Chamber of Commerce, headed by Max H. Hirsch, have subscribed an issue of \$175,000 in bonds to erect a mammoth four-story reinforced concrete building adjacent to the Southern Pacific shops in the Brooklyn district to house the new plant of the Grand Rapids Show Case

Company. This company plans spending approximately \$600,000 in its new plant and its annual output will be of a value of \$2,000,000. Approximately 400 high grade mechanics will be employed.

Wash., Wenatchee—Construction of a \$100,000 warehouse and office building, to house the Wenatchee branch of the Powell-Saunders Wholesale Grocery Company, will be started in the near future, it is announced by Glenn B. Pewell, vice-president of the company.

Wash., Seattle—Warehouse—Frederick & Nelson, department store, and F. S. Harmon Company, furniture manufacturer, plan the erection on Westlake Avenue of two warehouses, at a combined cost of \$750,000. One structure will be 6 to 8 stories high, while the other will be 4 stories.

Buildings (Miscellaneous)

Calif., Los Angeles—Bank—Architects Walker & Eisen, 325 Pacific Finance Building, are preparing plans for a 13-story class A bank and office building to be erected on south side of 8th Street and extending from Main St. to Spring St. The site has been purchased by a local syndicate including J. B. Lilly, Paul B. Fletcher, Geo. H. Woodruff, Milton Kauffman, A. R. Walker and P. A. Eisen. The first floor, mezzanine and basement will be occupied by a new bank and each of the upper stories will contain 18 offices. Cost, \$1,000,000.

Calif., Los Angeles—Hotel—Fred Siegel, 414 Chapman Building, has purchased a lot on the west side of Figueroa Street between 5th and 6th Streets, and contemplates the erection of a 14-story class A reinforced concrete hotel building. The site is 60 x 165 ft. and the new building will cost \$1,000,000.

Calif., San Francisco—Hotel—Plans are being prepared by Bliss & Faville, architects, for the Post Street wing of the St. Francis Hotel. Present plans call for construction of two basement stories and two stories above the street, with foundations which will permit of ultimately running the structure up to 13 stories; \$2,000,000 in bonds will be issued by the Crocker Hotel Company, of which \$600,000 will be used for the wing construction, \$900,000 will be reserved for later additions to the wing, and \$500,000 will be used to retire outstanding bonds.

Calif., San Francisco—School—The board of public works has advertised for bids, to be received June 6, for the construction of the new Francisco school at Powell, Francisco and Chestnut Streets. The building, which will contain 21 classrooms, will cost approximately \$272,000.

Calif., San Francisco—Plans for the expenditure of \$300,000 in the construction of two-story homes on 33rd Ave., between Fulton and Cabrillo Streets, have been announced by Oscar Heyman & Rothert.

Calif., San Francisco—Nurses' Home—Plans for the construction of a new nurses' home, costing approximately \$500,000, to replace the present structure on Sutter Street, between Scott and Divisadero Streets, were recently announced by J. B. Levison, president of the Mt. Zion Hospital. The building will be a class A structure, 6 stories in height, and will have accommodations for 115 nurses. The present building will be razed and work on the new structure will start within two months.

Calif., Santa Ana—School—The \$150,000 grammar school bond issue carried at the recent election. The former bond issue was rejected by bond buyers on the ground of technical error.

Calif., Los Angeles—Stores—Offices—Walter P. Temple and Milton Kauffman, Title Insurance Building, have purchased 300 acres east of San Gabriel and will establish a townsite to accommodate 5,000 people. A 2-story class C business building will be erected upon each of the four main corners in the business district. The cost will be \$200,000. Walker & Eisen, 325 Pacific

Finance Building, are the architects. The new city will be called the Town of Temple.

Calif., Van Nuys—Offices—Work will start shortly on the new office building for the Southern California Gas Company. It will be located on the south side of Sylvan St. between Sherman Way and Sylmar St. and will be 1-story, 50 x 140 ft. The building will conform to general style of the company's office buildings, having two stone columns in the facade. The company has issued a \$5,000,000 improvement program for Southern California.

Calif., Los Angeles—School—The Cumneck School of Expression has purchased a square of the old Hancock Ranch, bounded by Third St., McCadden, Los Palmas and Second Street, on which construction will start at once. The buildings will follow early English architecture and will be constructed in the form of a hollow square. Estimated cost, \$200,000. Arthur S. Heineman, architect.

Calif., Los Angeles—Church—Final architectural drawings have been approved and accepted, and construction will start immediately on the new St. Vincent's Church. The structure will be located on the northwest corner of Figueroa and Adams Street. Cost is estimated at \$1,500,000, which includes the purchase of the property and erection of parochial residence. Albert C. Martin, architect.

Calif., San Francisco—Club—The Woman's Athletic Club is planning the improvement of the lot adjacent to its present site on Sutter Street, between Mason and Taylor. The new wing will include 60 bedrooms, dining rooms, card rooms, library and accommodations for the club's juvenile membership and other needed improvements, which will cost approximately \$300,000.

Calif., Sacramento—Articles of incorporation were recently filed by the Paramount Corporation of Sacramento, capitalization \$1,000,000. The company plans erection of the Paramount Theater on K Street, between 9th and 10th.

Calif., San Jose—Offices—The Pacific Gas & Electric Company has purchased lots on South Third Street, near San Fernando Street, on which it is planning to erect a \$100,000 building, three stories in height, to house all the local offices of the company.

Idaho, Pocatello—Store—Hotel—Plans are new being drawn for a \$53,000 store and hotel building to be erected on East Center Street, by the George Cacavas Company, a well-known grocery establishment. H. A. Falkenberg of Montpelier, Idaho, is the architect. Construction work on the new building is expected to start in the near future.

Ore., Portland—School—Contract was awarded by the board of school directors recently for general work, U. S. Grant High gymnasium unit, to A. Pajunen at \$115,000.

Ore., Marshfield—City Hall—The general contract for the erection of the new city hall was awarded to Graham & Aitken at \$39,970.

Ore., Portland—Stores—Apartments—Two important building units consisting of stores and apartment house are to be erected at East 41st Street and Sandy Boulevard and Broadway at a cost of \$150,000, according to a statement of Frank V. Healy, one of a group of Portland capitalists who are financing the project. It is planned to build the units distinct from each other with a court facing Broadway. The apartment house, Spanish style, will be 100 x 80 ft., of 3 stories and containing 25 apartments. The erection of this apartment house is on the co-operative basis and already several families have agreed to purchase apartments.

Ore., Portland—Bank—A 24-story tower together with a 3-story building addition are planned by the United States National Bank to occupy the 100 x 100-ft. lot on the N. E. corner of Broadway and Stark Streets, now oc-

cupied by the old Elks Building. Construction work is planned to start this fall when the present lease on the Elks Building will expire. It will be necessary to obtain special permission from the city council before erecting the tower as an ordinance prohibits the construction of office buildings more than 12 stories in height. A. E. Doyle in the Worcester Building is the architect.

Ore., Astoria—Offices—A business block costing between \$200,000 and \$250,000 is to be erected on 12th from Commercial to Duane Streets. The structure will be four stories high and 50 ft. deep. Fred L. Warren, C. R. Higgins, and Charles Niemi have completed the arrangements for this most extensive building project for Astoria since the fire.

Ore., Portland—Stores—A 2-story building costing between \$75,000 and \$100,000 is being planned by Houghtaling & Dougan for N. M. Unger, and is to be built on the south side of Alder Street between 6th and Broadway. The structure is to be Louis XIV style with figures in base relief along the upper wall. On the lower floor there will be three store rooms and on the upper floor five specialty shops may be fitted up with large windows facing Alder Street.

Ore., Portland—Apartments—A 4-story apartment house is to be erected at a cost of \$100,000 by G. E. Heatham, 1170 East Davis Street. The location of the new building is 261 Eleventh Street and was planned by Claussen & Claussen, architects.

Utah, Brigham City—School—T. G. Rowland, of Logan, has been awarded contract for the erection of an addition to the Bear River Valley high school, located between the cities of Garland and Tremonton; price, \$55,350.

Wash., Sedro Woolley—Lodge—Plans for a new Masonic Hall to cost \$60,000, to be erected here, are being completed by Architect Andrew McQuaker, Mehlhorn Building, Seattle. Structure will be two stories high.

Wash., Sedro Woolley—Hospital—Plans for new unit at the Northern Hospital for Insane have been changed to provide for a home for nurses and attendants, instead of ward building, as planned. New home will cost about \$85,000, and will provide for 120 nurses and attendants. Heath, Gove & Bell, Tacoma, architects, are preparing plans.

Wash., Seattle—Apartment—The Hawthorne Improvement Company plans the erection of a \$200,000 group of apartment houses to cover an entire block in the Fremont district. Structure will be 2 stories with basement.

Wash., Seattle—School—Union High School District plans the erection immediately of an \$85,000 high school structure, to contain a combination assembly hall and gymnasium, 12 classrooms, besides manual training and domestic science quarters.

Wash., Seattle—Court House—The Warrack Construction Company, here, recently received contract for construction of the proposed court house, jail and post office at Cordova, Alaska, to cost approximately \$100,000.

Wash., Seattle—School—Wilson's Modern Business College will construct a new home, to cost about \$85,000. Building will be 2 stories and basement, 120 x 108 ft., of mill construction.

Wash., Tacoma—School—Voters at city election recently authorized a \$2,400,000 bond issue for the construction of new schools. Plans provide for six new intermediate schools, one large grade school and additions to seven grade schools.

Wash., Olympia—All bids for erection of main portion of the Legislative Building, part of the Capitol Group at Olympia, were rejected and new bids will be called on June 8. The lowest bid submitted was that of the Western Construction Company, Seattle, at \$666,864. The building is to be erected to the main dome.

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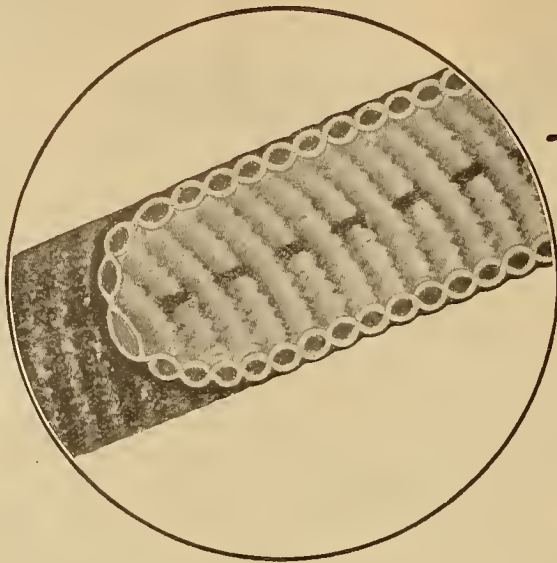
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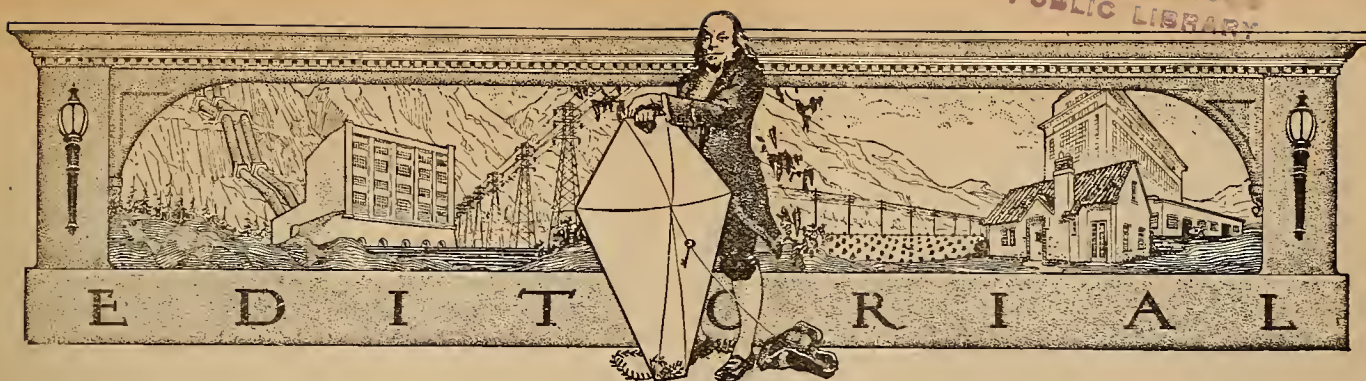
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The West Leads Again

IN winning the gold medal of the Charles A. Coffin foundation for the year 1923, the Southern California Edison Company has again established the supremacy of the West in electrical development. This medal, which was awarded at the National Electric Light Association convention, just concluded, is to be awarded each year to the public utility operating company within the United States which, during the year, has made the greatest contribution to the development of the general use of electric light and power by the public and to the benefit of the industry.

EIGHTEEN electric light and power companies participated and presented reviews of their activities and accomplishments covered by the field of the award. Among the outstanding records submitted to the committee of the fund by the Southern California Edison Company were the following: tremendous gain in the number of consumers and output of electric energy during the year; the growth of the company's business, and increased efficiency in operation; establishment of department of greater service to improve public relations; the great increase in the sale and use of electric appliances, resulting in an appreciable addition to the company's revenue.

OTHER activities cited were the introduction of scientific rate schedules which permit the company to realize its fixed charges and at the same time allow the customer to obtain greater kilowatt-hour use without increased cost; the exceptionally liberal policy of the company

in making extensions to consumers in rural communities; the development and operation of especially high voltage lines which have tended to improve service, and at the same time keep down investment to a minimum; very marked increase in the efficiency of the company's employees, and in the reduction of cost in handling customers' accounts; improved construction methods which have tended to reduce the number of interruptions to service, and improved methods of operation, assuring flexibility in distribution and greater reliability of continuity of the company's service; and the greatest increase in the number of shareholders obtained by any electric utility company in the United States.

IN common with other western companies, the Edison organization's success is due to two dominant conditions; first, the high public regard due to the sincere desire to serve; and second, the inherent disposition of the engineer to invade new fields and undertake the seemingly impossible. Both the public relations enjoyed by California utilities and the pioneering instincts of their engineers are matters of national comment, which will be vastly augmented by this recognition through winning the Coffin award.

IN view of wide interest taken by almost all of the large utility companies who were competitors for the gold medal, it will be recognized that the compliment paid to the Southern California Edison Company is one of unusual character, and must have been justly merited.

Valuable Document Issued on California Hydroelectric Power Systems

WATER Supply Paper 493, just issued by the U. S. Geological Survey in cooperation with the Forest Service is perhaps the most complete, authoritative and informing document ever issued on the subject of hydroelectric development. The book, which deals with the hydroelectric power systems of California and their extensions into Oregon and Nevada, was written by Frederick Hall Fowler, formerly District Engineer of the U. S. Forest Service, and now consulting engineer of San Francisco.

Prior to its publication no single work gave a complete description of all of the systems serving the state, and those who were interested in the subject were forced to search an extensive and widely scattered literature. The need for data on existing developments was keenly felt by officers of the Forest Service in 1910, when the engineering force was reorganized and new and broader water power regulations were adopted. In August, 1911, in order to obtain comprehensive data, Mr. Fowler was detailed to make the study which has resulted in the volume just published.

The report was considerably larger in scope than first planned, and now comprises the available information on the history, markets, electric systems, finances and rates of each of the operating hydroelectric companies in the state and shows in outline the general conditions under which they have attained their present state of development. The work therefore represents an economic as well as an engineering study.

Over twelve hundred pages are devoted to text; the illustrations number fifty, and tables over three hundred. In addition large maps, in color, furnish an informing supplement to the text. The book is destined to occupy a prominent place on the desk of every hydroelectric engineer, and power company official in California. Mr. Fowler is to be congratulated on his clear and able presentation of his subject. The amazing amount of information made readily accessible cannot but arouse admiration in anyone familiar with the magnitude of the task involved.

Heating Specialist Holds that Home of Future Will Be Heated Electrically

“ANY one connected with the electrical industry who fails to recognize the possibility of electric heat as applied to the home will be soon left behind in the march of progress,” said an exponent of electric heating before a recent gathering of electrical men.

In his talk, which was in the nature of a prophecy, he stated substantially, “that successful electric heating of homes in the future will depend on the intelligent design and construction of homes, together with the proper selection and installation of heating devices. Homes will be constructed to eliminate as far as possible thermal losses through the walls and windows. In cold climates vestibuled doors with ac-

curately controlled ventilation and temperature will provide against excessive losses.

“Homes will be arranged for the thorough thermal insulation of hot water conductors together with the proper location of hot water storage equipped with automatic water heaters and economy hot storage limiting valves.”

Indeed it would seem that with built-in electric cooking equipment in the kitchen and a segregation of living quarters from mere storage space; with small dressing rooms, and an adequate capacity in electric heaters installed with temperature controls and time switches, the electric home of the future will provide the maximum of comfort and convenience.

In any case electric heating is growing in some sections of the West and will grow as fast as our public service companies can take care of the load. When railroads quit hauling coal and oil, for their own use, and immense power plants of high efficiency are located at the source of fuel supply and falling water, the production of electric energy will grow faster than operating expense and fixed charges—then why, electric heating being possible today, should it not be popular in the future?

To What Extent Shall the Public Utilities Advertise?

“SHALL the modern, progressive public utility corporation depend, in its effort to hold public good will, upon the chance that periodicals will either be willing to write frequent articles about it or accept articles from its press agents for free insertion, or shall it buy advertising space, as does the merchant and banker, to get and keep its story before the public?” This is the question which will occupy the attention of several hundred public relations men representing the leading public utility companies who have organized the Public Utilities Advertising Association, and are meeting for the first at the convention of advertising clubs at Atlantic City.

Prominent in the general display of advertising of public utilities which will be a feature of the convention, is a display clipped from more than fifty Colorado, New Mexico and Wyoming papers, which attracted widespread attention when exhibited recently in St. Louis. It will be exhibited in conjunction with the general exposition of high-class advertising, which is always an outstanding feature of the meetings of the world's foremost advertising men.

A similar request from the National Electric Light Association, which has arranged an advertising exhibit to be held at its annual convention in New York, has been made to the Rocky Mountain Committee on Public Utility Information, Denver, with which a majority of the public utility companies of the three states is affiliated. It was through the activities of the committee, which has been instrumental in promoting the use of newspaper space for advertising; that attention first was drawn to the fact that the West is far in the lead in this field.

"The public utility institutions of the three states served by this committee advertise more regularly and more often than the utilities in any other state in the nation," states George E. Lewis, manager of the information committee. "I do not refer to merchandise advertising alone; I mean 'good-will' advertising—advertising designed to acquaint the people with the affairs of their public service organizations. All over the country public utility companies are adopting the idea."

Public utilities throughout the entire West have been among the first to appreciate the business and good-will building value of a systematic and continuous advertising program.

A Motto Is Suggested for the Enterprising Contractor

COUNTLESS are the editorial preachments that have been written declaring that a business succeeds and prospers today only to the extent which it renders to the public a definite service. No doubt there are electrical firms which are not rendering that measure of service to the public which they should. Prominent among these are the contractors who consider price alone when figuring on a job, and who skimp on a contract in order to make a profit. That they are not only hurting themselves and their business but are lowering the plane of the entire electrical industry apparently has not been brought home to them. It is inevitable that the sour fruits of their unsatisfactory service will ultimately have to be gathered, but they cannot be reclaimed by editorial admonitions alone.

The following motto, which was taken from the wall of a small but prosperous contractor-dealer establishment in an intermountain town, has been sent to us by a correspondent:

"Count that day lost
Whose low descending sun
Finds profits shot to hell
And business run for fun."

This strikes us as an appropriate sentiment to adorn the walls of any business. We suggest its adoption by our cooperative electrical organizations and trade associations, who might well circularize their members accordingly. The sentiment expressed may be crude, but it is nevertheless true.

A Satisfied User is the Best Salesman

THE electrical industry in the western states is overlooking one of the greatest factors standing in the way of increased range sales, despite the strenuous efforts of central stations and manufacturers to augment the use of this major electrical appliance. As is brought out in the Commercial Section paper on "Merchandising Electrical Ranges" which is to be read before the coming convention of the Pacific Coast Electrical Association, and which was published in the last issue of the Journal of Electricity and Western Industry, the failure on the part of the men in the industry themselves to univer-

sally adopt electric cookery in their own homes is partly to blame for the indifferent reception which is being accorded range sales efforts. In this paper the authors draw an analogy between the electric range salesman whose wife uses some other form of fuel at home and the automobile salesman who calls on his prospective customers with a horse and buggy or on a bicycle. To this we would add the bald-headed barber who attempts to sell his customers hair tonic. The paper suggests that the central stations inaugurate a plan whereby an electric range may be placed in the home of every man in the company who has any dealings with the public on the subject of electric ranges. We are thoroughly in accord with such a plan. Familiarity with the superiority of electric cookery bred by experience will enable the salesman to intelligently propound the idea to his prospective customer. Knowing that the salesman himself is a user of an electric range, the housewife herself will be a more sympathetic listener. Such a practice cannot help but result in increased sales.

As soon as we realize that electricity and the use of attendant appliances is a service and that it is this service we are buying; not just the article itself—whether it be an iron, a percolator, washing machine or house wiring—the nation will be a long way towards complete electrical conversion. It won't be long, now, before life without every conceivable electric help and appliance will be considered as hopelessly old-fashioned and impossible as it would without the conveniences of mail delivery, without the automobile, department store or any similar daily need.

The cost of electricity decreased 2.4 per cent in the ten-year period from 1913 to 1923, according to a statement of the United States Department of Labor in its regular report on changes in the cost of living. This is the first report in which the cost of electricity is separated from the customary "fuel" and "light" item. During the same period the cost of "fuel and light" increased 86.2 per cent, the report says. The total average increase in the cost of living since 1913 is placed at 68.8 per cent; food has increased 42 per cent; clothing, 74.4 per cent; housing, 62.4 per cent, and furniture, 117.4 per cent.

"The great rural stretches of the country challenge the electrical industry to reach out and lighten the burden of ten million farms, the backbone of the nation," states Philip Rose, editor of the Country Gentleman. "Will the electrical industry accept the challenge? I think it not only will but that it has made a most creditable start."

"It cannot be denied that the public generally is coming to a better understanding as to the problems of the public utilities, and is beginning to realize that their interests in large measure are bound up with the success and financial stability of the public utilities supplying the necessities of life."—F. W. Smith, Pres. N.E.L.A.

CURRENT COMMENT



Someone has said that it is the latent desire of ninety-nine per cent of the people who reside east of the Rocky Mountains to make California their future

home. Proof of the truth of this statement is contained in the statements which have recently been issued by Californians, Inc., a San Francisco organization,

which is engaged in telling the nation through the medium of advertising and publicity of the glories of the state in general and Northern California in particular. The campaign conducted by the organization has done more than give decided impetus to the number of tourists who annually visit the state; it is showing the United States that California offers unusual opportunity for the average man to work and make a home. Thus the campaign is proving a powerful factor in increasing the prosperity of the state by attracting to it a large flood of new population and new capital.

The advertising is being carried in 57 publications having 18,000,000 circulation and 50,000,000 estimated readers. There are three types of copy, tourist, home-seeker and settler opportunity. This copy is appearing in 18 national magazines, 7 farm magazines and 32 daily newspapers.

On May 1 at the end of the first six months of the campaign there had been received a total of 108,000 coupon and letter inquiries. Sixty per cent were general, 25 per cent were directed toward farming opportunities, 10 per cent were from home-seekers and the remainder sought information about investments, business and employment. The majority of the inquiries were from the Middle West, 48 per cent of them being directed from that section of the country. The remainder were as follows: Eastern States, 35 per cent, Northwest, 15 per cent, Foreign, 2 per cent.

A total of 149,000 letters have been sent out while 234,000 copies of the various books and pamphlets which have been prepared by the organization have been distributed. Special investigations to the number of 5,300 have been conducted for the benefit of inquirers. Railroads have received the names of 75,000 people for follow-up and have reported from 10 to 20 per cent of them travel prospects.

The organization is just completing its campaign for funds for its second year. A budget has been prepared and California organizations are being solicited for contributions for the continuation of the advertising. The movement is one which is worthy of the utmost support.

A nation-wide survey which has just been completed by the National Electric Light Association has developed some highly interesting facts regarding municipal ownership. Regarding the material secured from the survey as a whole, the impression is that municipal ownership insofar as public utilities are concerned, is

Municipal Ownership is Waning

on the wane, despite the political agitation which has been prevalent in several states during the past year. Some of the striking facts uncovered by the survey follow:

The majority of municipal plants are in towns of 1,000 population or less, where funds cannot be raised except by pledging public credit.

Municipal plants produce only 4 per cent of the electricity generated in the country, and this percentage is constantly decreasing.

The average rate of all municipal plants is more than twice as high as the average rate of all companies reported by the U. S. census.

In 1912 power was purchased by 8.7 per cent of the municipal plants. In 1917 power was purchased by 23.3 per cent, and there has been a great increase in the number of municipal plants which have shut down their generating plants since 1917.

Many so-called "municipal electric plants" are merely distributing systems, and purchase their power from companies. Estimates based on the McGraw electrical directory show that in 1921 over 26 per cent of all municipal plants purchased power, and the trend during 1922 in that direction has been marked.

Of the population of the United States served with electricity, the companies serve 93.8 per cent and the municipal plants 6.2 per cent.

The average city tax rate in 1921 as shown by the U. S. census in cities over 30,000 having municipal plants doing commercial business was \$19.31. The average city tax rate for the non-municipal plant cities nearest in population to the above was \$15.50.

Mandamus proceedings for the dual purpose of holding the funds of the California State Railroad Commission out of the state general fund and to require

the use of such funds for commission purposes only will be introduced into the courts immediately after the close of the fiscal year June 30, 1923, according to

Colonel H. G. Mathewson, secretary of the commission. The contemplated action is a friendly one to

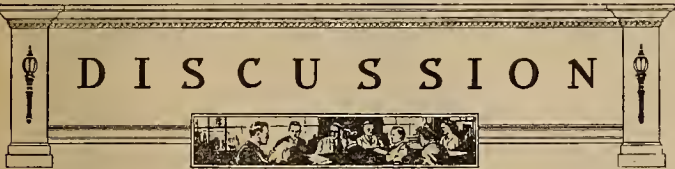
determine by court decision the procedure in the expenditure of the commission's funds under the provisions of the Public Utility Act and the recently enacted budget bill. Approximately \$100,000 is involved in the litigation.

"If we must transfer these funds, paid to the commission for valuations, bond issue approvals, inspections and such matters, into the general fund," says Col. Mathewson, "the commission may as well suspend work. All we will be able to do will be to answer correspondence.

"The fees represent the actual cost of the work done plus a small overhead charge. If we must do the work on the money provided in the appropriation bill, and pay the fee into the general fund, we will merely be receiving money from the Treasury in one hand and passing it back with the other. At present the fees create a revolving fund to carry on the work."

Section 85 of the Public Utilities Act is relied upon to hold the fees in a special fund. It provides that money paid into the State Treasury by the commission under the provisions of the section calling for the valuations, assessments and such duties, shall be credited to the "Railroad Commission fund," and appropriates them to carrying out its provisions.

The budget bill provides that in all cases in which statutory provision or appropriations have been made for items of salary or support included in the budget bill the amount fixed in the budget bill shall govern and the other appropriations shall not be deemed in addition. The bill then provides, however, that appropriations for purposes not otherwise provided for in the budget bill shall not be affected by the budget bill.



Eastern Engineer Is Interested in Cost of Operating California Electric Home

To the Editor:

Sir: As one of the craft I am interested in what your correspondent, Mr. H. L. Garbutt, has to say about the cost of an electric home in California.

An analysis of the cost develops an interesting fact regarding water heating. He maintains a storage system, automatically controlled, the most wasteful way to heat water, according to the gas man's experience.

The most efficient way is to heat water instantaneously, next to that it may be heated intermittently and last of all, as far as economy is concerned, hot water may be held in storage.

The reason why small capacity water heaters have met with favor is that they do not increase the connected load very much, but this may be easily controlled by a double throw switch between the range and water heater or, better than that, an auto-

matic overload circuit breaker may be used (under seal) as is done by the Milwaukee Electric Railway & Light Company on some power services.

In the small town of Morrisville, Vermont, there are about 75 services having combined cooking and water heating installations. The water heaters are 3-kw. capacity. The manager of the plant is responsible for the statement that the average use of electricity by these customers was 200 kw-hr. per month, approximately.

I know of a case where a family of three in a city of 16,000 population has been using a combined cooking and water heating service for seven years, the average use for both purposes being 150 kw-hr. per month. The water heater was 3-kw. capacity and tank not lagged.

What staggers me regarding the cost of operating the California electric home is the cost of water heating. As I understand it, the charge for the month was made up as follows:

| | |
|---|-------------------|
| 30 kw-hr. @ 8c. | \$2.40 |
| 130 " @ 3½c. | 4.55 |
| 141 " @ 2c. | 2.82 |
| 301 " for cooking, lighting and operating two 600-watt air heaters and 7-kw. in air heaters. | |
| 548 kw-hr. @ .003 | 1.64 |
| Fixer charge | 2.50 4.14 |
| 849 kw-hr. @ 1½c. | \$13.91 per month |

If one could obtain a 1½ cent rate in the East we would all have electric homes.

The point I wish to make is that the amount of electricity used for water heating is all out of proportion to the cooking costs and heating the house.

RALPH J. PATTERSON,
Boston, Mass. Eastern Sales Manager,
May 22, 1923 Aetna Electric Appliance Co.

Department on Electrical Construction Arouses Interest of Trade

To the Editor:

Sir: I am enclosing herewith a letter from W. S. Berry which is indicative of the favorable reception which the department on electrical construction is receiving from the trade.

WESTERN ELECTRIC COMPANY, INC.
Supply Department, 680 Folsom Street, San Francisco.
May 23, 1923.

Earl Browne,
c/o Browne-Langlais Elec. Cons. Co.,
213 Minna Street,
San Francisco, California.

Dear Earl:

I read with a great deal of interest your article on electrical construction appearing in the Journal of Electricity and Western Industry, issue of May 15, and I also read your first article.

This kind of work is putting over the convenience outlet idea on a big scale and personally I want to thank you for what you are doing along this line. The articles are both interesting and instructive, and the industry is to be congratulated in having an electrical engineer giving so much of his personal time to the promotion of this very interesting subject.

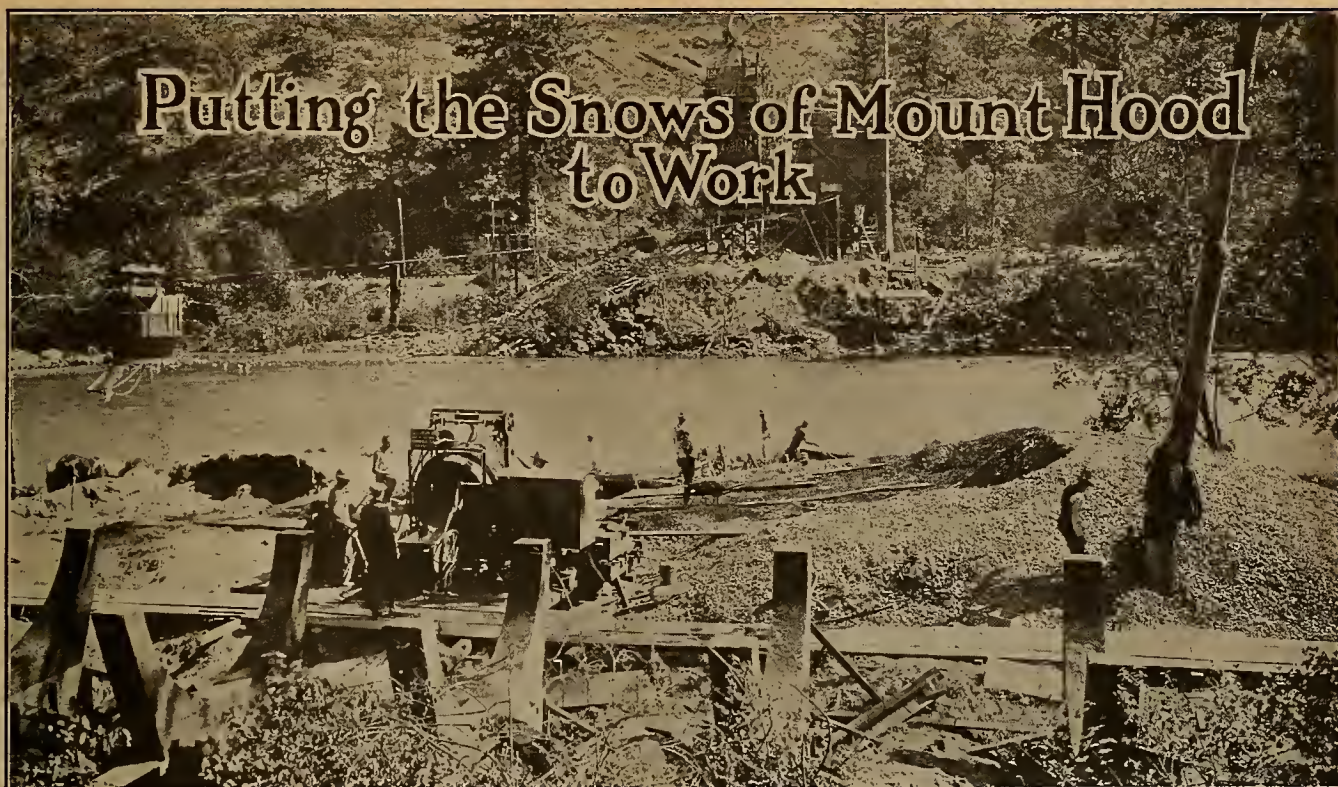
Yours very truly,
(Signed) W. S. BERRY,
Sales Manager.

E. EARL BROWNE.

San Francisco, Calif.
June 1, 1923.



MOUNT HOOD which rises to a height of over eleven thousand feet supplies water from its melting snows to drive the turbine of the new Powerdale Plant of the Pacific Power & Light Company. The photograph was taken from an altitude of 7,000 feet.



THE Powerdale development of the Pacific Power & Light Company on Hood River is of importance in that its installation marks the resumption of new power plant construction in Oregon after several years of inactivity due to conditions arising from the war. It is believed that from now on there will be considerable new hydroelectric and steam power plant construction in the state.

The Powerdale plant is also important in that it contains the largest single hydroelectric unit in Oregon, and the entire development is equipped with the most modern and up-to-date auxiliaries.

Water is diverted from Hood River about three and one-half miles above its mouth and about three miles due south of the city of Hood River. The dam is of concrete and consists principally of three piers with the necessary wing walls and abutments. Between these piers are two horizontal steel roller gates electrically operated. The main gate is 75 ft. long and 6 ft. 3 in. in diameter, and the short gate on the west side is 25 ft. long and 7 ft. 8 in. in diameter. The tops of the piers are connected by a steel foot bridge and an operating house is built on the middle pier. In this house is located the control for the roller gates. Immediately over the intake gate is a second operating house for the intake control. Between the power house and the intake and dam is a communicating lead of nineteen wires for the operation of company telephones, for the trans-

By Lewis A. McArthur
Vice President and General Manager
Pacific Power & Light Company

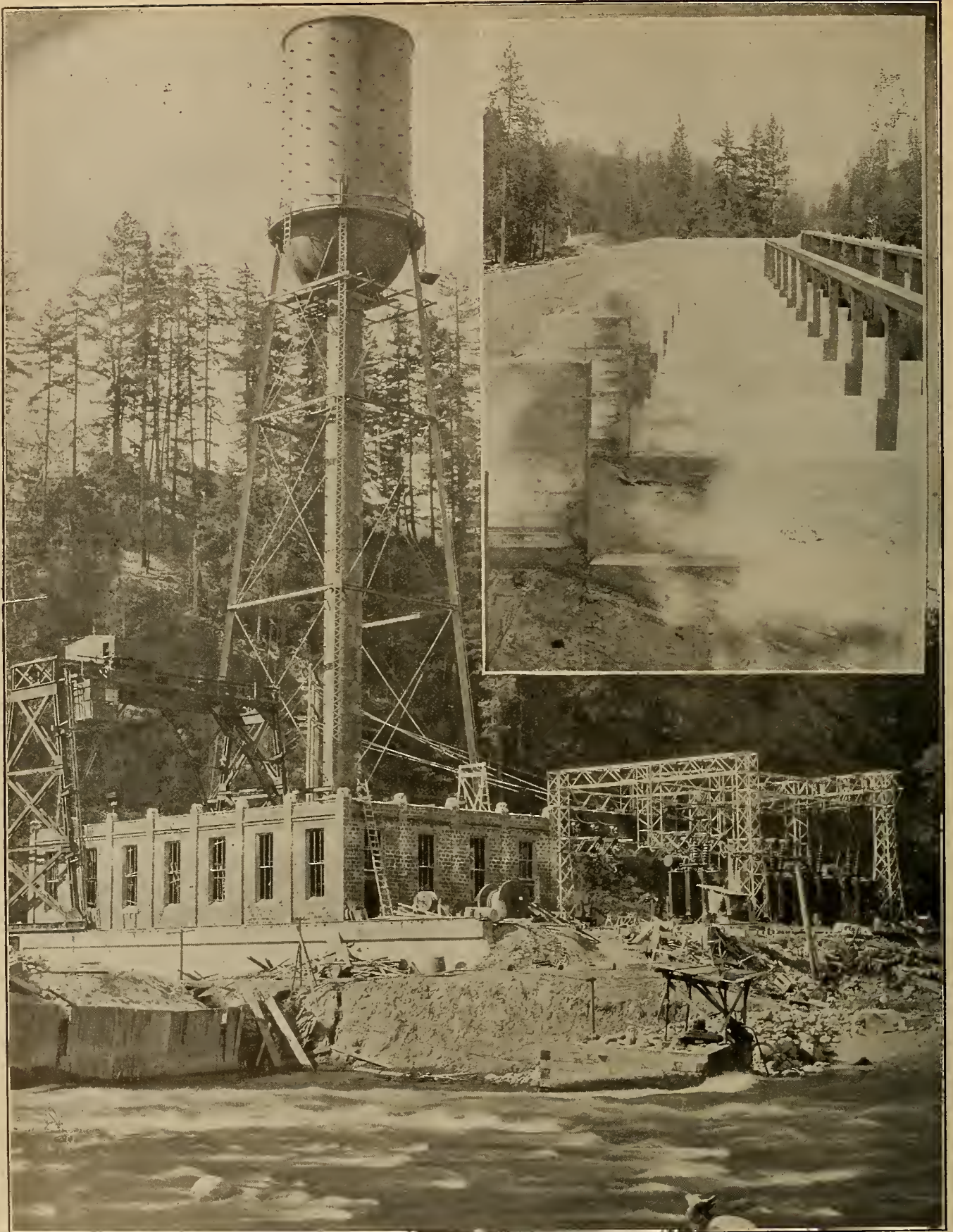
THE Powerdale plant of the Pacific Power & Light Company is the newest hydroelectric plant in the Pacific Northwest. Water from the glaciers of Mount Hood is utilized to develop approximately nine thousand horsepower of electrical energy. This plant was delivering energy in less than a year from the time that construction was actually started.

mission of water gage instrument readings and for the remote control of the gates. The dam is equipped with an approved type of fish ladder.

After leaving the intake the water traverses a concrete lined canal 520 ft. long. The capacity of the development is 500 sec.-ft. of water. The water then enters a settling basin 142 ft. long by 48 ft. wide, this settling basin being built immediately adjacent to and

on the west bank of the Hood River. The Hood River has as its main source of supply glacial water coming from Mt. Hood and during certain seasons of the year this water carries large quantities of silt. The settling basin has been installed for the purpose of eliminating this abrasive material. The basin is built of reinforced concrete and the water is skimmed off along the east side into a spillway which is directly connected to 977 ft. of open wood flume supported on trestles. This open wood flume is transposed into 10-ft. diameter wood stave pipe at a transition house. There is very little loss in head between the dam and this transition house which is more than one-quarter of a mile away. Between the transition house and the power house the flow line contains the following different types of construction:

- 7,851 ft. 10-ft. diameter wood stave pipe
- 604 ft. 10-ft. diameter steel pipe.
- 1,409 ft. 8-ft. 4-in. diameter steel pipe
- 120 ft. 8-ft. diameter wood stave pipe
- 4,506 ft. 8-ft. 4-in. diameter wood stave pipe.



The new Powerdale plant of the Pacific Power & Light Company on the banks of the Hood River in Oregon. The differential surge tank may be seen behind the power house. The top of the tank is 207 ft. above the base of the turbine which operates under a head of 187 ft. In the insert is shown the specially designed sand trap which is located at the intake of the pipe line. Water to be used in the turbine is skimmed from the top.

The total flow line is 15,985 ft. long. The steel pipe has been placed in positions where there are possibilities of rocks and slides coming down from the side hills above. The short stretch of 8-ft. wood pipe is installed on a steel bridge which takes the flow line from the west bank to the east bank of the stream. During the construction period this steel bridge, which is 120 ft. long, was washed out by a flood and taken several hundred yards downstream without being damaged. It was taken off a gravel bar and put back in place without serious consequences.

The pipe line is supported by 1,360 reinforced concrete saddles. A number of the saddles and a considerable amount of the excavation on this development were completed in 1913 when the Pacific company first planned construction of the plant.

Differential Surge Tank Used

A short distance before the power plant is reached the pipe line goes under the tracks of the railroad through a steel section, and just before it enters the power plant it is connected by means of a tee to a Johnson differential surge tank with a total height of 207 ft. The size of the tank, which is held above the standpipe on four steel legs, is 28 ft. in diameter and 57 ft. high. The standpipe is 7 ft. 9 in. in diameter and the overflow pipe discharge is 3 ft. in diameter. The surge tank is immediately adjacent to the power house.

An interesting feature of the surge tank and standpipe is the presence of a series of angle-iron lugs arranged around the pipe so that if necessary lagging can be put on to prevent freezing during the winter time.

The power house building is of hollow tile, concrete plastered, and is 47 ft. x 82 ft. and is 17 ft. high. The top is covered by two hatches which may be removed so that the apparatus may be lifted out for repair purposes. In the opposite end of the building from the generator room is a large repair pit into which the apparatus may be dropped by the crane, which travels on outside tracks, is electrically operated, and has a total capacity of 40 tons.

The water wheel is an I. P. Morris unit with a rated capacity of 8,700 hp. It is designed to operate at 360 r.p.m. under a net effective head of 187 ft.

It is on a vertical shaft direct connected to a 7,500-kva. Westinghouse Electric & Manufacturing Company 3-phase, 60-cycle generator delivering power at 7,200 volts.

The switchboard is located in a room immediately adjacent to the generating room and consists of twelve panels carrying switch controls and instruments, including the necessary water gage instruments and control for the intake three miles away. All switches carrying high voltage are in fireproof compartments and are remote controlled from the switchboard. One interesting feature of the switching system is a supplementary auxiliary switch which may be substituted, by means of a duplicate bus, for any oil switch in the installation without interruption to service. This makes it possible to substitute the reserve switch for a switch that may have become damaged, and the damaged switch may be repaired without affecting the operation of the plant in any way. The switchboard was built by the General Electric Company. There are also remote control switches for the two banks of 66,000-volt switches in the switchyard. These were built by the Westinghouse Electric & Manufacturing Company.

New Water Control Units Installed

Before reaching the surge tank the pipe line enters a Venturi meter so that an exact record may be kept of the amount of water used by the plant. Between the surge tank and the power house is the Johnson valve hydraulically operated, and the water wheel itself is equipped with a concrete Moody spreading type draft tube for effective water discharge. This is the only plant in Oregon that is known to have the Moody draft tube, the Johnson control valve and differential surge tank and steel roller gates.

Immediately west of the plant is a steel frame switchboard containing four 2,000-kva. radiator type transformers built by the Westinghouse Electric & Manufacturing Company. These transformers are equipped with oil conservators and are used to step up the energy from the Powerdale plant to the Dalles-Hood River power system.

Construction work on the project was started on June 1, 1922, and the plant was put in operation on May 10, 1923.



Excavating and building the coffer dam preparatory to constructing the diversion dam on Hood River. In the picture to the right may be seen a number of the concrete saddles on which the pipe line is laid.

Radio and the Electrical Dealer

By David Sarnoff

THE manufacture and distribution of radio apparatus has become a national industry. Radio broadcasting stations are located so that entertainment is heard in practically every part of the United States. Probably more than a million and a half broadcast receivers are in use today in this country. I know of no other industry which has grown so rapidly in so short a time. In fact, the past year has seen radio pass through more progressive stages than the average new product will go through in a decade, and the electrical jobber and the dealer have played an important part in furthering the popularity of the radio set.

The apparatus for radio broadcast reception had its birth in the electrical industry, and it was, therefore, natural that the electrical jobber and the electrical dealer should become the channels of distribution. That the electrical jobbers and dealers have handled millions of dollars' worth of this merchandise in the past year and a half is a matter of considerable credit to the electrical industry. The electrical dealer has now established himself in the radio field, and those with vision and merchandising ability have the opportunity to remain as the leading radio dealers in their communities.

In the early part of 1922, selling radio devices was largely a problem of satisfying the consumer demand. There was at that time little call for real merchandising effort. There followed a somewhat dull summer period; but this was the natural reaction to a period of inflated demand and was more than compensated for by the substantial volume of business effected during the last fall and winter and during the spring of the present year.

Future Prospects for Radio

We may look with confidence to a good year in radio for 1923 and the years to come. The sustained interest in radio and the public recognition of broadcasting as a useful and educational as well as entertaining service justifies this view. Dealers now purchase their radio supplies in a more business-



DAVID SARNOFF

Vice-President and General Manager of the Radio Corporation of America, who discusses the future of the electrical dealer in aggressively merchandising radio appliances.

like and substantial way and there is comparatively little pyramiding of orders, such as was experienced early in 1922. Dealers are also more cautious about the quality of the apparatus they select for sale to the general public. The fact that there has been no hysterical activity this year, and the demand steadily strong, is a healthy indication that the radio business is rapidly becoming a stabilized industry. As the broadcasting stations have constantly improved the quality of their entertainment; as the public is becoming more interested in receiving this entertainment; and as the development of dry battery tubes has made possible the easy transportation of radio equipment to the summer home, to the camp, in the automobile or in the boat, it is reasonable to

expect that business this coming summer will hold good and that it will be followed by an autumn of very marked activity.

Active Merchandising Needed

But selling conditions in radio have changed. The radio dealer has now to engage in aggressive selling methods. The dealers who are building the most successful radio businesses are those who (1) carry the best equipment, (2) give the best service and (3) go out to get business. Many dealers throughout the country have already anticipated these requirements. They have established service shops where damaged sets are repaired; they have a crew of salesmen who put sets into the home on trial and they have construction men whose business it is to erect aerials and make installations. Such dealers are establishing themselves in the radio business on a firm foundation and they will reap a large reward as time goes on.

The radio business has been very helpful to the electrical dealer. In many cases it has doubled or trebled his income, but he can not reasonably hope or expect to derive the full advantages which this new business offers unless he puts sales effort into its development. The keynote of healthy sales is serv-

ice, but service without sales effort will not develop a prosperous business. The electrical dealers have sold radio at a good profit to themselves, but they will do still better when active and aggressive selling methods are employed.

In the case of other electrical devices, dealers have been called upon to develop a demand. Radio is probably the only commodity ever offered to them for which a public demand was created almost overnight. The job now is to maintain and increase the public demand. Dealers must at this period study market conditions and not slow-down their efforts in any respect. There is a nation-wide demand for radio in the home which can only be satisfied by intelligent merchandising methods energetically prosecuted along constructive lines. There is no reason why the electrical dealers should not be able to do everything in a merchandising way that any other dealer can do.

Women Are the Best Prospects

In the phonograph business, I am told that eighty per cent of all sales of phonograph instruments are made to women, and radio being in the nature of a musical instrument, will have to be sold to the woman of the home. In order to attract the woman to the store of the electrical or radio dealer, it is necessary to provide the little accessories that appeal to and attract her. A show-case full of parts or shelves filled with various types of apparatus mean little or nothing to her. Radio devices are becoming more and more decorative, and they must match the rest of the furniture, if she is to be pleased with their appearance. A great majority of men and women are interested in two important functions, namely, appearance and simplicity of operation. Women particularly are not interested in the technicalities of radio reception and the various types of circuits which many technical salesmen in back of the dealer's counter have been accustomed to employ as a part of their sales talk. I do not think that the electrical dealers as yet fully appreciate the sales value of having:—

1. Their store arranged in such a way as to attract the woman of the home.
2. The type of salesman who understands that the woman is to be sold on the basis of appearance, simplicity of operation, and price.

In a certain western city, there is a radio store which approximates very closely what I expect will be the ultimate retail radio store of the better class. This store, located in the center of the retail shopping district, uses the two large display windows on either side of the entrance to the utmost advantage. The display in one of these windows depicts a home scene showing radio being used in the living room. The other window is used to display various types of sets, and this window is re-decorated daily. Entering upon the wide front doors, you see a large marble room, decorated in gold, with rugs scattered about the marble floor. In the back of this beautiful show room are large booths, in each of which is a complete radio receiving sets and one or two comfortable chairs. Here the various types of sets are operated

for the benefit of the prospective customer. Around this show room are tables upon which complete receiving sets are displayed. There are no shelves stocked with boxes, nor are any parts exhibited or sold in this display room. Almost any time you care to go into this store, you will find a number of ladies inspecting and inquiring about various makes of sets, or in the booths, listening to their operation.

Upstairs, over this show room, with a separate entrance from the outside of the building, leading to a stairway, is a completely separate branch of this retail store. In this upstairs room, work-benches are arranged about the walls, in front of which there hang from racks, tools such as pliers, screw drivers, soldering irons, etc. At one end of this room, and partitioned off from it by wire netting, is a stock room well filled with a large assortment of parts.

In this work-room the amateur is welcomed. He can use the work-bench and tools for a nominal sum of about ten cents an hour, and can purchase such panels, parts and cabinets as he requires from the Parts Department, at the end of this room. An efficient radio man is always in attendance, and if any of the amateurs become confused or need suggestions in their work, they are at liberty to call upon this expert who will give them such assistance as they require. These amateurs are kept away from the display room downstairs, because no parts may be had in that section of the building, and no salesman in the display room knows enough about circuits to talk to even the least experienced amateur. The salesmen in the display room are strictly salesmen. The extent of their knowledge of radio is the proper finish and appearance of the set and how each model should be tuned to get results.

Installing on Ten Days' Trial

In this very modern retail store, there is maintained a crew of three outside salesmen, whose work it is to go out and make arrangements for the installation of the radio receiving set in the home, on trial. Their work is followed up by the service man who makes the complete installation, takes a receipt for the set, explains to the prospective customer how it is operated, and leaves it in the home for this prospect's use. The set is left in the home for a period of ten days, during which time the dealer learns by telephone calls, whether or not the set is operating satisfactorily. At the end of that time, the salesman calls upon the prospect and either collects the money, which he does nine times out of ten, or advises his house to send a man to call and pick up the set. If the customer is unable to pay all of the money in cash, the dealer will accept a third down and the balance in thirty, sixty or ninety days, with a slight additional charge for the time payments, plus interest on the notes. This additional charge, plus the interest, carries a large portion of the overhead for this dealer.

The public is turning definitely to the purchase of complete radio sets which carry the name of well known manufacturers and which are, therefore, known to have behind them manufacturing and research facilities which spell performance and quality.

The electrical dealer must expect to have a considerable amount of healthy competition in the selling of radio, just as he has in the selling of vacuum cleaners, washing machines and other similar merchandise. Department stores and music houses will undoubtedly enter the field of radio to an increasing extent as the new and more recent developments in the art are placed on the market. In the past the active electrical dealer found no difficulty in competing successfully with department stores who were handling similar lines of merchandise. Such competition serves to create a very healthy business for that particular class of merchandise, and will be a means of increasing the electrical dealer's sales both in complete sets and accessories, as soon as he has prepared to take advantage of the opportunity.

In recent years, electrical dealers have seen the advantage of demonstrating electrical appliances, such as washing machines and vacuum cleaners, in the home. By such sales methods progressive dealers have greatly increased the volume of their business, for it has been demonstrated that many do not appreciate the good influence that radio will bring to the home until they have had an actual home demonstration. Others are doubtful as to their ability to operate a radio set, believing that it is extremely complicated. Only an opportunity to use a good set will convince such people.

Consistent Activity Will Produce Results

Radio is settling down to a permanent business with ever-increasing opportunities. In a word, it is being stabilized. Energetic and consistent sales activity will produce the outstanding radio dealer of the future. The constant application of vision, initiative and service will in the long run bring permanent results.

In summary, there are three requisites which, if followed, will assure the dealer of a substantial place in the industry:—

- (1) Carry the best line of apparatus.
- (2) Give the best service, and
- (3) Go out after the business by carrying radio into the home.

Let us keep before us the potentialities of the industry in which we are now engaged. The radio set should not be considered merely as an electrical device. It is in fact the greatest educational force that has ever been placed at the disposal of mankind; for through it the voice of the world's leaders in progressive thought is brought directly to the fireside. The best in music, literature and in the arts and sciences becomes available to listeners everywhere. This makes broadcasting a beneficial, vital and living force.

Recent Safety Rule Developments

By R. R. COWLES*

THE activities of the Safety Rules Committee of the Pacific Coast Electrical Association for the past year have been confined chiefly to the consideration of the Electrical Safety Orders of the Industrial Accident Commission of the State of California. The committee has cooperated with the Safety Rules Committee of the National Electric Light Association in studying the National Electric Safety Code and the National Electric Code as well as the changes proposed thereto. This committee has not concerned itself directly with the rules for overhead line construction as incorporated in General Order 64 of the Railroad Commission of the State of California as this particular subject was assigned to the Overhead Systems Committee. Any recommendations which the Safety Rules Committee has made regarding these rules have been handled through the Overhead Committee.

Meetings of the Safety Rules Committee were held in San Francisco on Nov. 24, 1922, and in Fresno at the engineering conclave on March 22, 1923. It was represented at the national meetings of the Safety Rules Committee in Milwaukee, Sept. 17 and 18, 1922, and in New York on Jan. 29, 1923.

At the meeting of the Safety Rules Committee in San Francisco on Nov. 24, 1922, a committee was

appointed to study and make recommendations on matters relating to "Services and Metering Installations." This committee has made the following recommendations:—

1—That grounding of transformer secondaries as covered under General Order 64 of the Railroad Commission be permitted at other points than at the transformer pole and also that primary and secondary grounds should not be permitted on the same pole.

2—That the fuse be omitted in the grounded wire of 3-wire and 2-wire branch blocks.

3—That the space allotment of meters as incorporated in the proposed revised form of the Electrical Safety Orders be changed in accordance with certain dimensions submitted by this committee.

The first recommendation was submitted to the Overhead Systems Committee for its consideration while the second and third recommendations were adopted by the Industrial Accident Commission's general committee.

The chairman of this committee has acted as a clearing house for suggestions regarding the Safety Orders of the Industrial Accident Commission and in this capacity has kept closely in touch with the meetings of the committee which has been preparing these orders.

Your committee believes that a brief resume of the history and present status of the various local

Safety Rules Committee: R. R. Cowles (chairman), E. R. Banks, J. M. Buswell, R. H. Cates, P. O. Crawford, W. R. Frampton, C. F. Gilcrest, C. A. Heinze, Lloyd Henley, N. B. Hinson, W. F. Jordan, H. G. Keesling, L. M. Klauber, J. A. Koontz, F. B. Lewis, S. J. Lisberger, E. R. Northmore, E. Y. Porter, G. H. Searle, T. W. Snell, W. H. Talbot, P. M. Wentworth, J. W. Wheeler, G. M. Wills, J. E. Woodbridge.

and national Safety Codes might be of value and therefore submits the following:—

In 1913 the California State Legislature passed the Workmen's Compensation Act which, among other things, authorized a commission known as the Industrial Accident Commission to issue certain orders covering the installation of electrical equipment in compliance with standard safety practice. The Commission requested the cooperation of various electrical interests to the end that a committee might be formed to draft the proposed Electrical Utilization Safety Orders. This committee consisted of the following:

- S. J. Lisberger (chairman), engineer of electrical distribution, Pacific Gas & Electric Company, representing the National Electric Light Association, San Francisco.
- J. M. Barry (vice-chairman), chief, Department of Electricity, City of San Francisco.
- John Hood, San Francisco; engineer, General Electric Company, representing the manufacturers of electrical equipment.
(H. C. Stanley, General Electric Company, alternate to Mr. Hood.)
- H. C. Reid, California Association of Electrical Contractors and Dealers, San Francisco.
- Carl E. Hardy, superintendent Electrical Department, City of Oakland.
- Max A. Schmidt, Schmidt Lithograph Company, representing the California Employers' Federation, San Francisco.
- F. Emerson Hoar, gas and electrical engineer, State Railroad Commission, San Francisco.
(R. M. Vaughan and P. J. Noerager, State Railroad Commission, alternates to Mr. Hoar.)
- George Sorenson, secretary, Local Union No. 537, International Brotherhood of Electrical Workers, San Francisco.
- H. M. Hansen, business agent, Local Union No. 404, International Brotherhood of Electrical Workers, San Francisco.
- Arthur Elken, Local Union No. 6, International Brotherhood of Electrical Workers, San Francisco.
- W. H. Urmey, Local Union No. 6, International Brotherhood of Electrical Workers, San Francisco.
- J. Morgenthaler, Pacific District Council, International Brotherhood of Electrical Workers, San Francisco.
- R. H. Manahan, city electrician, Los Angeles.
- H. Conger Bowers, consulting electrical engineer, Southern California Electrical Contractors and Dealers, Los Angeles.
- H. M. Scott, International Brotherhood of Electrical Workers, Los Angeles.
- R. L. Eltringham, electrical engineer, Industrial Accident Commission.
- John R. Brownell (secretary), superintendent of safety, Industrial Accident Commission.

In 1916 this committee completed its work, and after a public hearing was held, the Electrical Utilization Safety Orders became effective on Jan. 1, 1917.

In a similar manner another committee prepared the Electrical Station Safety Orders which became effective on Dec. 1, 1918. This committee consisted of the following:

- J. P. Jollyman (chairman), engineer of electrical construction, Pacific Gas & Electric Company, representing the National Electric Light Association, San Francisco.
- J. A. Lighthipe, electrical engineer, Southern California Edison Company, representing the National Electric Light Association, Los Angeles.
- J. A. Koontz, electrical engineer, Great Western Power Company, representing the National Electric Light Association, San Francisco.
- M. C. McKay, general superintendent, Sierra & San Francisco Power Company, representing the National Electric Light Association, San Francisco.
- Walter T. Bivins, chief engineer electrical equipment, United Railroads of San Francisco, representing the California Electric Railway Association, San Francisco.
- S. H. Anderson, electrical superintendent, Pacific Electric Railway, representing the California Electric Railway Association, Los Angeles.
- R. H. Manahan, city electrician, City of Los Angeles, representing the League of California Municipalities, Los Angeles.
- Arthur Kempston, chief, department of electricity, City of San Francisco, representing the League of California Municipalities.
- R. T. Joslin, engineering department, representing the Pacific Telephone & Telegraph Company, San Francisco.
- J. C. Fricke, representing the Western Union Telegraph Company, San Francisco.
- H. C. Shaw, division electrical engineer, representing the Postal Telegraph Cable Company, San Francisco.
- John Hood, San Francisco engineer, General Electric Company, representing the manufacturers of electrical equipment, San Francisco.
- R. F. Behan, Westinghouse Electric & Mfg. Co., representing the manufacturers of electrical equipment, San Francisco.
- J. Morgenthaler, president Pacific District Council No. 1, International Brotherhood of Electrical Workers, San Francisco.
- C. A. Elmore, president Cable Splicers Union No. 37, International Brotherhood of Electrical Workers, San Francisco.
- Henry Boyen, Linemen's Union and Station Operator's Union No. 151, International Brotherhood of Electrical Workers, San Francisco.
- H. Warner, Local Union No. 51, International Brotherhood of Electrical Workers, Los Angeles.
- William L. Rhys, representing the International Vice-president of the International Brotherhood of Electrical Workers, San Francisco.
- J. F. Pollard, gas and electrical department, State Railroad Commission, San Francisco.

- B. D. Dexter, gas and electrical department, State Railroad Commission, San Francisco.
- R. L. Eltringham, electrical engineer, Industrial Accident Commission, San Francisco.
- John R. Brownell (secretary), superintendent of safety, Industrial Accident Commission.

The General Lighting Safety Orders became effective on Dec. 1, 1919.

After the Electrical Utilization Safety Orders had been in effect for about four years, it became apparent that a revision of these orders was essential. They were difficult to interpret as they lacked the necessary detail and were not sufficiently explanatory to cover cases which were continually arising. Improvements in the art have been rapid and this together with the difficulty of municipal inspectors attempting to enforce two sets of rules (the National Electric Code and the Electrical Utilization Orders) made a revision necessary. It must be borne in mind that the city ordinances covering electrical wiring in this State are based upon the National Electric Code while the Workmen's Compensation Act obligates these same municipalities to enforce the orders of the Industrial Accident Commission; and incidentally all departments of the state government are likewise so obligated. It was therefore apparent that in the revision of these orders, it should be the endeavor to combine the essential features of the National Electric Code with the Orders of the Industrial Accident Commission.

Following the procedure used in the formulation of the 1917 Orders, the Industrial Accident Commission wrote to various interested organizations such as manufacturers, employers of electrical labor, employees, and members of municipal inspection departments, etc., requesting them to appoint representatives on a committee whose duty would be the revision of the Electrical Utilization Orders. The first meeting of this committee was held on Sept. 22, 1919. At this meeting the sub-committees were organized and delegated certain portions of the work. A sub-committee composed of members of the Safety Rules Committee of the Pacific Coast Section of the National Electric Light Association was asked to prepare orders relating to "Services and Metering, High Voltage Services, Transformer Vaults and Class B Substations." These sub-committees prepared the original sections of the Orders and on Oct. 24 a general committee met for the consideration of the preliminary orders and their preparation in final form. This general committee consisted of the following:

- S. J. Lisberger (chairman), representing the Pacific Coast Electrical Association, Affiliated with the National Electric Light Association.
- R. H. Manahan (vice-chairman), Department of Electricity, Los Angeles, representing the League of California Municipalities.
- H. W. Stitt, Department of Electricity, Fresno, representing the League of California Municipalities.
- Ralph W. Wiley, Department of Electricity, San Francisco, representing the League of California Municipalities.
- Carl E. Hardy, Department of Electricity, Oakland, representing the League of California Municipalities.
- Fred B. Lewis, representing the Pacific Coast Electrical Association, Affiliated with the National Electric Light Association.
- C. W. Mitchell, representing the Board of Fire Underwriters of the Pacific.
- J. C. McCaughern, representing the Board of Fire Underwriters of the Pacific.
- C. E. Fleager, representing the Pacific Telephone & Telegraph Company.
- E. E. Browne, representing the California State Association of the Electrical Contractors and Dealers.
- G. E. Arbogast, representing the California State Association of the Electrical Contractors and Dealers.
- Morris M. Bruce, representing the San Francisco Chapter, American Institute of Architects.

W. W. Hanscom, representing the San Francisco Section, American Society of Mechanical Engineers.
 R. A. Balzari, representing the Electrical Manufacturers' Safety Association of California.
 M. C. Hixson, representing the Electrical Manufacturers' Safety Association of California.
 E. M. Schlessinger, representing the Electrical Manufacturers' Safety Association of California.
 Samuel P. Russel, representing the Electrical Manufacturers' Safety Association of California.
 W. T. Bivins, representing the California Electric Railway Association.
 B. C. Hill, representing the California Association of Electrical Inspectors.
 B. B. Beckett, representing the San Francisco Section, American Institute of Electrical Engineers.
 T. A. Panter, representing the Joint Committee of the Technical Societies of Los Angeles.
 Robert L. Eltringham, representing the California Electrical Cooperative Campaign.
 G. A. Anderson, representing California Electrical Jobbers.
 J. H. Clover, representing the State Building Trades Council, and the California State Federation of Labor.
 James McKnight, representing the State Building Trades Council.
 George F. Flatley, representing the California State Federation of Labor.
 Amos H. Feely, representing the International Brotherhood of Electrical Workers.
 Kenneth Howard, representing the International Brotherhood of Electrical Workers.
 J. E. McCaffrey, representing the Railroad Commission of the State of California.
 T. W. Simpson, representing the Electric Sign Manufacturers.
 H. D. Brown, representing the Moving Picture Industry.
 H. M. Wolfelin, superintendent of safety, Industrial Accident Commission.
 G. E. Kimball, electrical engineer, Industrial Accident Commission.
 F. A. Short (secretary), electrical inspector, Industrial Accident Commission.

Alternates

R. R. Cowles (alternate for S. J. Lisberger).
 W. F. Jordan, R. H. Cates (alternates for Fred B. Lewis).
 D. D. Smith (alternate for C. W. Mitchell).
 C. H. Judson, R. C. Barton (alternates for C. E. Fleager).
 J. S. Fairweather (alternate for Morris M. Bruce).
 Arthur B. Daly (alternate for J. E. McCaffrey).
 P. H. Affolter (alternate for R. A. Balzari).
 A. E. Rowe (alternate for M. C. Hixson).
 H. F. Yost, L. Siebert (alternates for E. M. Schlessinger).
 Carl A. Heinze, M. O. Bolser, O. Wingard (alternates for T. A. Panter).
 John W. Carrell, Daniel W. Martin (alternates for J. H. Clover).
 Arthur Kempston (alternate for Robert L. Eltringham).

From October 24 to Feb. 6, 1922, the General Committee was engaged almost continuously in the consideration and preparation of the orders. The Editing Committee was then instructed to prepare tentative orders for publication and in June, 1922, 6,000 copies of the Proposed Form of the Electrical Safety Orders were printed and distributed.

These orders cover Electric Utilization and Lighting Safety Orders and are in accord with the Electrical Wiring Rules of the National Electric Code, all pertinent features of the National Electric Code being incorporated. These proposed orders were widely advertised in the various publications and by means of circular letters, and requests were made for criticisms and comments from all interested parties.

On Feb. 19, 1923, the General Committee reconvened for the consideration of criticisms and comments and also to consider the proposed changes in the National Electric Code as initiated by the Electrical Committee of the National Fire Protection Association.

At this meeting the following recommendation of the Safety Rules Committee was read and adopted for inclusion in these Orders:

(a) Safe and convenient means shall be provided so that meters on service exceeding 150 volts to ground may be readily tested without hazard to the tester and without interrupting the service (provided that this shall not apply to single motor installations of less than 5 hp.).

(b) The device required by sub-section (a) of this order shall also be provided for testing meters on installations requiring a service switch of greater than 30 amperes capacity (regardless of voltage to ground) and for testing meters in hospitals or similar institutions (regardless of voltage or ampere ca-

capacity) where the interruption of service may constitute a hazard.

(c) This order shall not be construed to apply to private individual dwellings, but shall apply to the master meter in apartment houses, hotels, and similar institutions.

This recommendation was the result of several months' active consideration by the Safety Rules Committees and has the endorsement of the Meter Committee. The necessity for such a provision is primarily the result of the requirements for totally enclosed iron clad electric installations as specified in the Electrical Safety Orders. It was felt that the completely enclosed installation would introduce hazards to power company employees in testing or changing meters, which could only be obviated by such "safety testing devices" as recommended by the committee.

The Meter Committee has been asked to prepare general specifications covering types of "Testing Devices" which will be satisfactory to the utilities concerned. It is intended that these specifications be submitted to the General Committee for approval prior to the public hearing.

As the California Electrical Safety Orders are to be in accord with the National Electric Code any changes in said code must necessarily affect these orders.

The General Committee adjourned on March 17 and will take no further action until the public hearing which will be held in the near future. The Electrical Safety Orders will become effective shortly after this public hearing.

No changes are at this time contemplated in the Electrical Station Safety Orders as published in 1918.

The question of jurisdiction of the Industrial Accident Commission in the enforcement of the Electrical Safety Orders has caused considerable discussion. The Industrial Accident Commission has jurisdiction over "employment and places of employment" with the following exceptions: household domestic employees, state, federal and city employees, also overhead and underground lines owned and operated by public utilities which are under the jurisdiction of the Railroad Commission. The Industrial Accident Commission has jurisdiction over generating stations, and substations owned and operated by public utilities. The Electrical Station Safety Orders apply specifically to public utility generating stations, substations, etc.

Many municipalities in California have written into their ordinances, provisions requiring that all electrical work shall be performed in accordance with the Safety Orders as well as the National Electric Code, and some have specified these as minimum requirements. Certain municipalities require other features which are not included in these orders. Inspection outside of the limits of incorporated cities and in those cities which do not have an electrical inspection department are made by the Electrical Department of the Industrial Accident Commission. This Commission has authority to make inspection inside the limits of incorporated cities.

On Oct. 16, 1922, the Industrial Accident Commission initiated a program for the preparation of Elevator Safety Orders and on Jan. 3 a committee was appointed composed of three members from the American Institute of Electrical Engineers, two from the American Institute of Mechanical Engineers and two from the American Institute of Architects. This committee held a meeting on Feb. 6, 1923.

The National Electric Safety Code has been adopted by the American Engineering Standards Committee with the understanding that a sectional committee would be appointed to revise Part 2 of the Code having in view particularly the necessity for standard railway crossing specifications.

The National Electric Safety Code is now subject to change only by the joint agreement of all the interests concerned and cannot be changed by the Bureau of Standards alone as heretofore.

The American Engineering Standards Committee requested a combination of the Fire and Safety Codes to be effected by the American Institute of Electrical Engineers, National Electric Light Association, National Fire Protection Association and Bureau of Standards. An effort was made to have all the sponsors withdraw but the Bureau of Standards declined, therefore the combined code is still under consideration. A meeting is to be called sometime after October, 1923, with the above object in view.

A meeting of the sectional committee for the revision of the National Electric Safety Code was held in Washington on Nov. 2, 1922, at which were present representatives from the public utilities, public service commissions, casualty insurance companies and other interested organizations. At this meeting an organization was created of which Dr. Lloyd of the Bureau of Standards is chairman, C. W. Hayden of the Railroad Commission of Wisconsin, vice-chairman, and R. C. Dwyer of the Bureau of Standards, secretary. A board of directors of nine members was chosen, one from each important interest affected by the code. The National Electric Light Association is represented by Thomas Sproule, chairman of the Safety Rules Committee of the National Electric Light Association, National Body.

The changes in the 1920 edition of the National Electric Code as proposed by the Electrical Committee of the National Fire Protection Association were acted upon at the public hearing in New York City on March 12, 1923. This association distributed a bulletin in January in which were included certain proposed changes. The Safety Rules Committee of the Pacific Coast Electrical Association, through its chairman, made suggestions regarding some of these proposed changes as well as to some of the existing rules which contained objectionable features. Most of these suggestions received favorable consideration at the public hearing.

A few of the more important changes to the 1920 edition of the National Electric Code which affect public utilities are enumerated below:

1—Rule 8-B formerly prevented the use of motor operating at a potential above 2,500 volts be-

tween conductors except in central stations, substations, generator and motor rooms. This rule to which your committee has consistently objected has now been changed to read as follows: "Motors operating at a potential exceeding 2,500 volts to ground shall be located in motor rooms except in central stations, substations and generator rooms."

2—Rule 15-m—New section added to read as follows: "Where instruments, meters or relays operate with windings or working parts at a potential of 150 volts or above to ground the cases and other exposed bare metal parts of these devices insulated from the current carrying parts shall be grounded unless isolated by elevation or protected by suitable insulating barriers or guards. The size of the ground connection shall not be less than No. 12 B. & S. gage.

"Where instruments, meters or relays are operated from current or potential transformers, the cases and other exposed bare metal parts which are insulated from the current carrying parts, shall be grounded. The ground connection should not be less than No. 12 B. & S. The secondary circuits of current and potential transformers shall be grounded. The ground connection should be of a size not less than in secondary circuit."

3—Rule 15-d—Amended to read: "and the ground conductor of an interior wiring system shall have but one grounding connection within the building served."

4—Rule 45—New section added: "General installation requirements for transformers should be followed wherever practicable except that by special permission of the inspection department, oil-filled transformers having a total or combined rating of 75 kv. or less may be located in furnace rooms of fire resisting construction, if surrounded by concrete curbs not less than 6 in. high forming a basin of sufficient capacity to retain all of the oil used in all of the transformers surrounded."

5—Rule 47—Amended to read: "Primary wires shall not be brought into buildings except power stations, substations and transformer vaults complying with Rule 45-a.

"Air break disconnects shall be installed between oil switches which are used as service switches and the supply wires."

The following addition to Rule 12 was proposed but rejected by the committee:

"Line wires of less than 5,000 volts between wires shall have an approved weatherproof or rubber insulated covering."

At the New York meeting of the Safety Rules Committee of the National Electric Light Association in Jan. 1923, the chairman was instructed to present a plan to the Technical Executive Committee by which the work of the Safety Rules Committee would be assigned to the other Technical Committees, using the headquarters engineering staff to correlate Code activities. This plan was approved by the Technical Executive Committee at its meeting on Jan. 31 which practically assures the discontinuance of the National Safety Rules Committee.

Standardized Entrance Switches

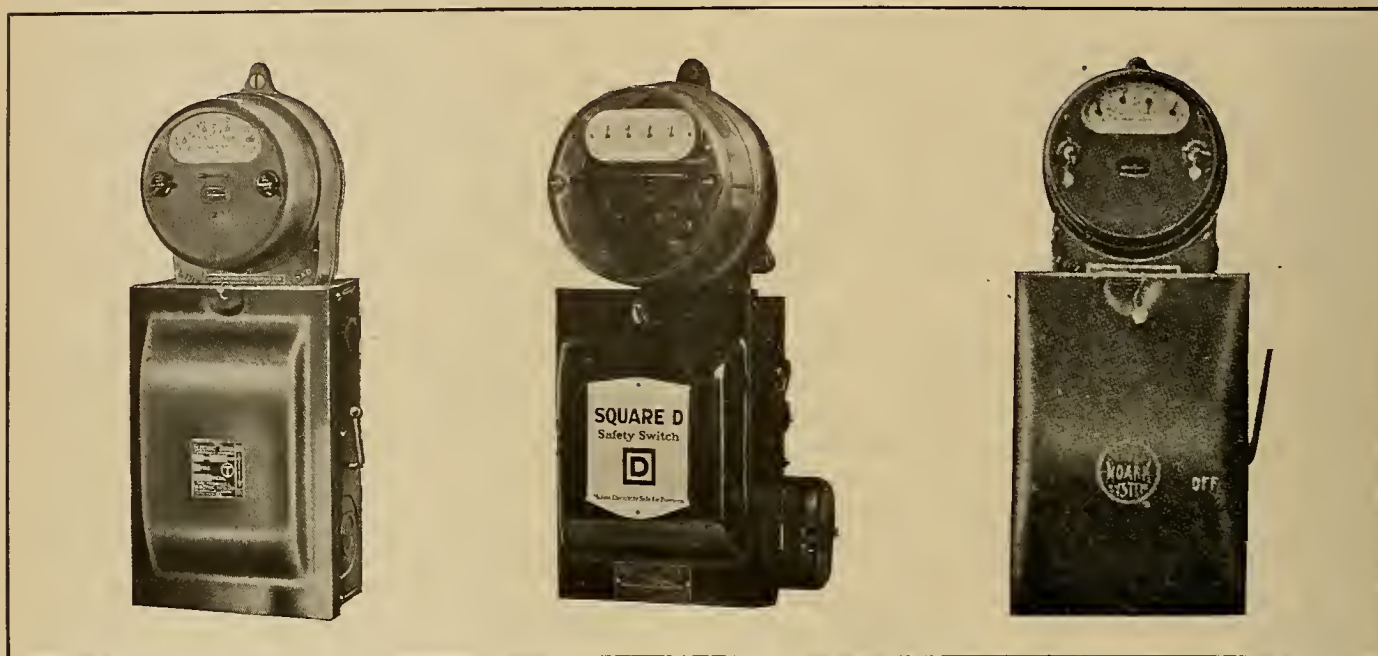
OF late, central stations in the West have been giving considerable thought to the most desirable type of service entrance switches to be used on their lines.

The desirability of having the meter attached to the entrance switch to avoid current theft and tampering has long been established. But to provide a means of successfully effecting this connection involved a great deal of difficulty in the past due to the fact that many different types of meters have been in service, and as many or more different designs of entrance switches. The difficulty of providing the right connection for these many combinations made the task a hard one.

secured of equal protection of its meters, transformers and other equipment. This was possible because the fuses, sealed within the metal switch box, could not be removed and metals of high melting point substituted, as was the more or less common practice. The oft-practiced trick of inserting a coin beneath the fuse plug was stopped.

A Large Number of Switch Designs

As time went on, more and more switch manufacturers entered the field, each with his individual idea of how a switch should be made. This, of course, introduced a new problem along with the multiplicity of types. Meter trims were not interchangeable. No two switches were alike, and no two



Standardized type of meter service of the Trumbull Electric Manufacturing Company.

Square D standardized entrance switch with meter and cabinet supported fuse block.

Noark standardized service entrance switch manufactured by the Johns-Manville Company.

The open knife entrance switch, of course, has long since been abandoned. The public and the entire industry have given their approval to the enclosed switch. This was at first for safety reasons alone. Then it became apparent that it was possible, at no greater cost, to incorporate within this enclosed switch certain features which would insure against the exposure of unmetered current. It was only necessary to make one end of the box removable and provide an end connection which would fit both the switch and the various meters employed. Thus the "meter trim" came into use.

With it came the practice of sealing the switch box shut. Immediately another great advantage was derived from the practice of sealing the switch box. The main cutout fuses were under seal and serviced by the company supplying the current. The consumer was thus assured of adequate and proper fuse protection at all times, and the power company as-

meters were of the same design. Consequently, no meter trim could be used for any but the one combination.

When a man from the central station went out to install a meter, he had either to take half a dozen different styles of meter trims with him or run the chance of returning for the correct one. He could not tell in advance which of the half dozen or more entrance switches he would find on arriving—and each make of switch demanded a different trim to fit his meter.

There were two alternatives confronting the central stations. They could either create a monopoly for one switch manufacturer by uniting in favor of his switch, or they could permit all makes of enclosed switches to be installed on their lines. The latter alternative would mean that they would have to provide themselves with meter trims to fit all the various switches manufactured. Neither alternative

was desirable; the first for reasons quite apparent; the second because it was impracticable since there was no way of determining in advance which make of switch the central station would find when they sent a man out to install a meter. Then, too, a change of meters would mean endless confusion.

However, there was one way to remedy the situation: to evolve an entrance switch of standard design and dimensions, and allow a number of manufacturers to produce it. It was agreed that this device should incorporate all of the features which experience had shown to be most desirable.

Standardized Entrance Switch Defined

Among the features were: first, provision for making either direct load or phantom load tests without interfering with the supply of current to the

switches which provide for the grounded neutral systems and also for those systems which do not carry the neutral grounded. The capacities include as high as 100 amp. in two and three-wire single phase, also polyphase installations in capacities up to 100 amp. Direct current installations are provided for in the same capacities.

The end wall trims for all standardized switches of the same capacity and number of poles are interchangeable among the various makes of switches.

Further Standardizing Moves

The latest thought is to provide a standard opening in the end wall into which a shutter is slipped which completes the device as a meter trim. The end wall is supplied by the consumer, the utilities supplying only the shutter. When a meter in-



A multiple installation of standardized entrance switches showing the use of meters of different sizes and types with the same switch. A separate end wall for each meter was formerly needed but, with the adoption of the new standard opening, only a separate shutter is needed to form a perfect trim between switch and meter.

premises and without the necessity of removing any wires or reconnecting after the test is completed; second, adequate fuse protection for the meter tester while working; third, ample clearance between the sides of the box and current carrying parts; fourth, provision for grounding the neutral wire within the enclosure; fifth, provision for a suitable method of banking switches in multiple installations; sixth, provision for entirely enclosing meter wires within a steel trim. All of these features were met in the device which was evolved and called the Standardized Entrance Switch.

This Standardized Entrance Switch was designed to meet these requirements and to provide uniform dimensions for all entrance switches of the same amperage and number of poles.

Among the standardized types will be found designs which comply with all operating conditions. There are switches which provide for the use of N.E.C. fuses in the 30-amp., 125-volt rating. There are switches which provide for all soldered connections, no binding screws being used. There are

stallation is made, it is not necessary to remove the whole end wall, only a small plate is removed. This leaves an opening in the end wall of a standard size. The meter connection is made through this and a simple, inexpensive shutter, designed to fit that particular meter, replaces the plate which was removed and makes a perfect meter trim. This is a further refinement and one which is another step toward absolute uniformity and simplicity.

The standardization idea was gratefully received by the central stations and contractors alike. Many utilities put into effect rulings requiring that all entrance switches served by them be of the standard design. The movement spread most rapidly in the East and Middle West, and now is engaging the favorable attention of western utilities. The benefits to be derived from the adoption of the standardized idea are so manifest both to utilities and contractors as well as the consumer who is assured the maximum protection and service, that it will not be long before it is universally in effect.

ELECTRICAL CONSTRUCTION



A FLAT is defined as a building of two or more stories containing separate self-contained dwellings, each dwelling having an independent entrance on the level of the street or from an outside vestibule on the level of the first floor. Flats, therefore, in some cities (notably San Francisco), come under the same classification as residences in so far as the electrical work is concerned, and all work, except the service installation, can be done as a knob and bushing system.

Although outlets may not be immediately put to use, it is strongly advisable to install wires in walls and partitions, from the second and third floors to the basement ceiling, at the time the building is being constructed, for future electric air heaters, ranges and water heaters. This can be done at comparatively small cost at this time, but is often difficult and expensive to accomplish after the building is finished. This is shown in the accompanying sketch, Fig. 1. What is most important, if this wiring is installed during the construction of the building, it is not necessary to disturb the tenants when it is desired to extend these circuits to meter board and there install the necessary switches and cut-outs. This point is in

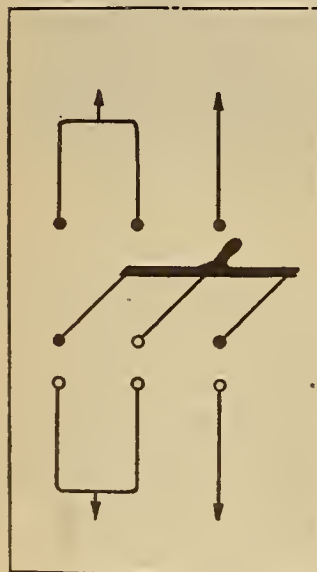


Fig. 5.

my opinion of the utmost importance as the future use of electricity for domestic heating is soon to be as universal as the electric iron and other so-called "socket devices" are today. Since the public has been sold the convenience outlet idea, no home is complete when inconvenient electrically, and even at this time people move into a new home or flat, taking their large air heaters with them, and find that the use of these appliances is impossible without considerable changes to the wiring.

By E. Earl Browne

AS Mr. Browne points out in this article the man engaged in electrical construction can make additional money for himself, save future expense on the part of the flat owner, and add to the convenience of the tenants, by persuading the owner to install adequate outlet facilities at the time the initial wiring is done, even though the same are not immediately used.

In the case of finished buildings where the installation of the electric air heaters, range and water heaters is desired, the cost of wiring for these devices becomes a rather expensive job, particularly in the case of the second and third floors, and in case the building contains hardwood floors. This is due to the fact that the major portion

of the work must be done in conduit from the meter board in the basement, along the basement ceiling joists, and up the outside of the building to the location of the various outlets. As good practice dictates that air heaters should be set under the windows in a room, it is logical that the outlets for these should be in the baseboard at that location. In case it is necessary to use exposed conduit on the outside of a building for this purpose, an "LB" Type of exposed fitting with cover and gasket installed on outside of building with a short nipple connecting to a switch

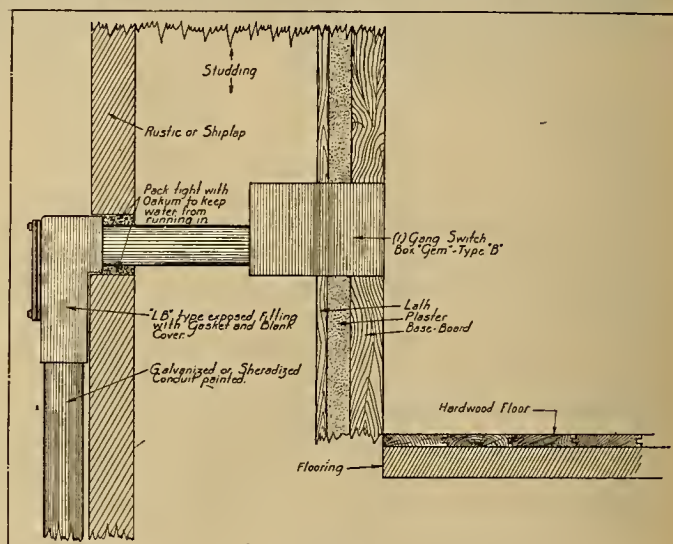


Fig. 2.

box, such as the Gem Type "B," makes a workmanlike job. (See Fig. 2.) If galvanized or sherardized conduit is used it can be readily painted to harmonize with the building.

In the case of the range and water heater, however, these devices are usually located some distance from an outside wall or light shaft and the best that can be done is to expose as little of the conduit in

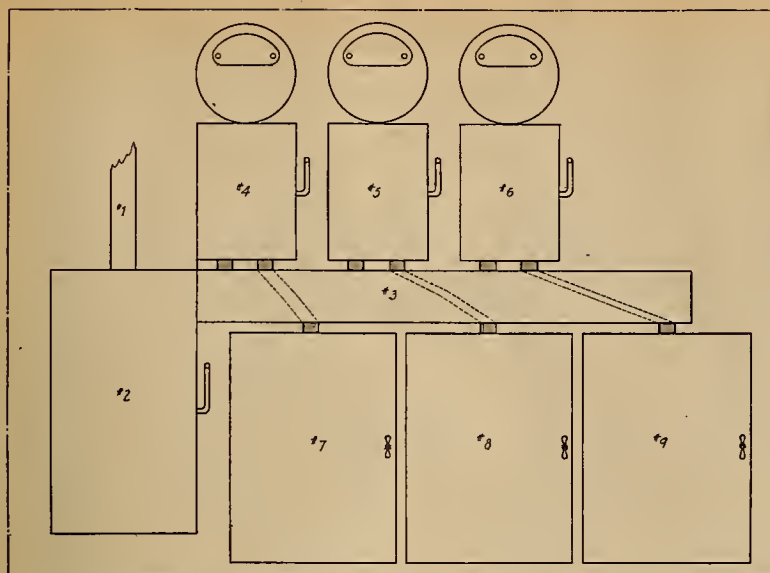


Fig. 4.

- No. 1—Service 3—No. 3/0 wires in 2-in. conduit.
 No. 2—200-amp., 250-volt, 3-pole externally operated service switch.
 No. 3—Metal wireway.
 Nos. 4, 5 and 6—60-amp., 250-volt, 3-pole externally operated main distribution switch.
 Nos. 7, 8 and 9—Steel cabinets each containing—
 1—60-amp., 250-volt, 3-pole switch for range and water heater,
 4—30-amp., 250-volt, 2-pole switch for air heaters,
 1—30-amp., 125-volt, 2-pole switch for lights.

kitchen as is possible. If there is sufficient space, and the hot water tanks are set in closets next to the flue, it is often possible to use flexible metallic conduit through this space from basement ceiling to the switch on wall.

The alterations to an existing service and meter and distribution board to accommodate the extra equipment are shown in Fig. 3 and Fig. 4 with the following assumed loads:

| | | | |
|-------------------------|--------------------|---|-----------|
| 1 Range | 7 kw. x 100% D.F. | = | 7.00 kw. |
| 1 " | 7 " x 66 2/3% D.F. | = | 4.67 " |
| 1 " | 7 " x 66 2/3% D.F. | = | 4.67 " |
| All air heaters | 30 " x 60% D.F. | = | 18.00 " |
| All lights | 4 " x 100% D.F. | = | 4.00 " |
| Total, | | | 38.34 kw. |
| 38.34 kw. ÷ 230 volts = | | | 167 amp. |

Service, Feeders and Sub-Feeders

Due to the extended use of convenience outlet circuits, the question as to where the dividing line should be, with regard to the size of wire in the

the No. 12 wires for the other. (See Fig. 5.) This meant that it was possible with the full connected load in operation to subject the one No. 12 wire to almost 35 amp., whereas the code rating of this size is but 25 amp. On the other hand, a 30-amp. switch was installed, thus limiting the fuse protection to 30 amp., which did not permit the occupant to use all of his translating devices.

In order to clear this situation in that city, the San Francisco Department of Electricity has ruled that any occupancy requiring over 35 amp., based on 115 volts, must have a 3-wire service, feeder or sub-feeder. For example, we will assume that a flat has

| | |
|-----------------------|------------|
| 1 convenience circuit | 1600 watts |
| 1 " " | 660 " |
| 3 lighting " " | 1980 " |
| Total, 4240 " | |

Dividing the 4,240 watts by 115 volts, we obtain 37 amp., which would require a 3-wire sub-feed.

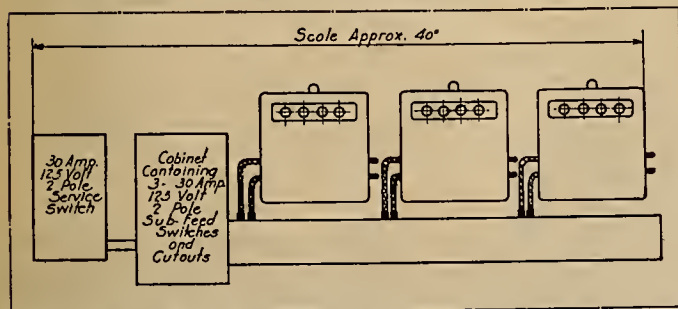


Fig. 3.—Alterations to this type of installation to accommodate extra equipment are shown in Fig. 4.

installation of a 2 or 3-wire, 230-115-volt service,¹ feeder² or sub-feeder,³ has been one on which, until recently, no distinct understanding has existed between the contractor, the inspection department and the power company. As a consequence, a contractor has in good faith installed, for example, three No. 12 R.C. wires for a 4-kw. load and the power company would set a 2-wire meter using two of the No. 12 wires for one side of the 115-volt service and one of

¹A "service" is the conductor by which a supply of electrical energy is carried from the point of connection to the main or sub-mains of the supply system to the service switch.

²A "feeder" is the conductor between the service switch and one or more main distribution centers.

³A "sub-feeder" is the conductor between a main distribution center and one or more sub-distribution centers.

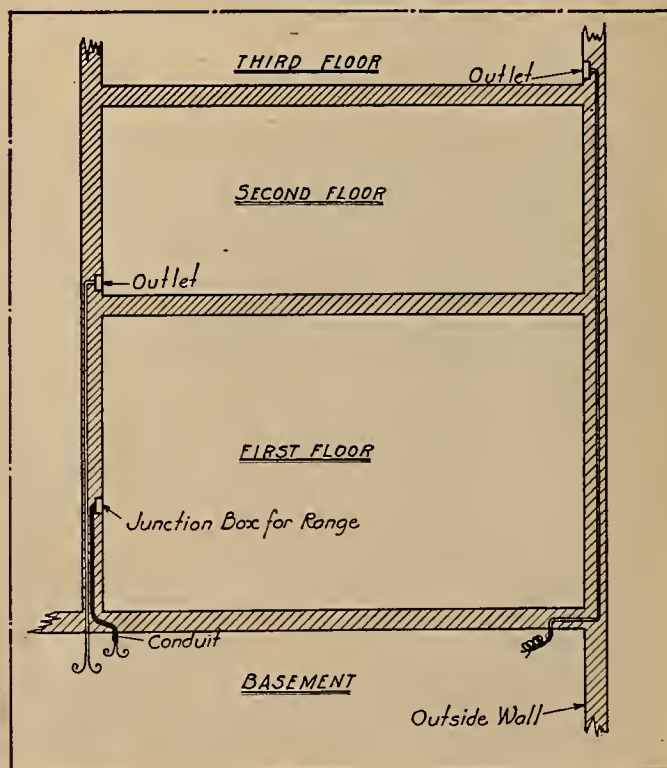


Fig. 1.

JOBBER, DEALER AND SALES AGENT



The second San Francisco Electric Home, erected at a cost of approximately \$22,500 and sold within two weeks after the close of the exhibition.

Second San Francisco Electric Home Is Displayed

Exhibition Sets New Low Record of Cost to the Electrical Industry—Visited by 15,500 People

California is believed to have achieved a record in the exhibition of an electric home at the least cost to the industry in displaying the recent home in San Francisco. The only cost borne by the industry was the time of the field representative of the California Electrical

Cooperative Campaign who prepared the wiring plans and supervised the installation, and the time of the campaign representative who acted as hostess.

The home, views of which accompany this article, was built by Leonard &

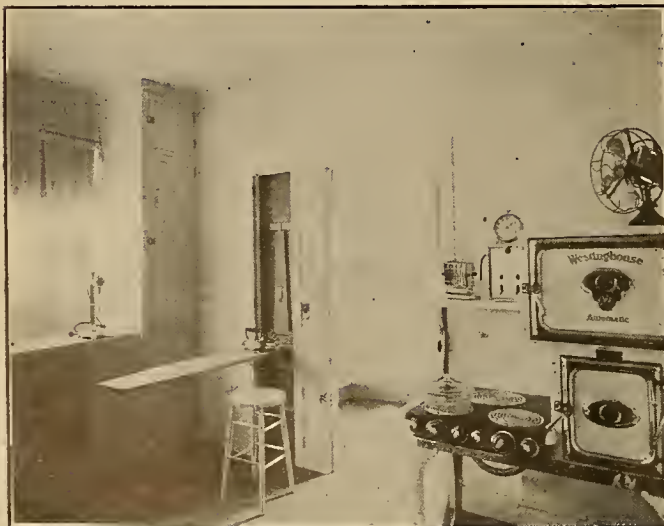
Holt, sub-dividers, in a new tract at Ingleside Terraces. Its cost was approximately \$22,500 and it was sold within two weeks after the exhibition closed. S. Heiman of San Francisco was the architect.

During the two weeks from May 3 to 20 a total of 15,000 visitors was conducted through the home. While it was hoped that this number would reach approximately 25,000, the small number can be explained by the fact that the home is located in one of the most outlying building additions and that the electrical industry did not take the fullest advantage of the opportunity offered for advertising the exhibition.

The home was a Spanish type stucco bungalow consisting of eight rooms and a large basement and laundry. Electrically, it was complete in every detail, the installation including the maximum number of convenience outlets. With the exception of the Adobe Home in Los Angeles, it was the largest and most pretentious of any so far displayed in this state.

The firms cooperating with the electrical industry in displaying the home were Sherman, Clay & Company, piano and music dealers, Lachman Bros., furniture dealers, Curtis Studio, oriental rugs, Durant-Steves Motors, Inc., automobile dealers, and MacRorie-McLaren Company, landscape gardeners. The cost of advertising and publicity was largely borne by these firms.

Several thousand four-page pamphlets explaining the home and inviting the public to visit it, were distributed by the firms who took part in the exhibition and through the electrical industry.



A view of one corner of the kitchen showing the range and some of the appliances.



The dining room, showing the complete electrical equipment and the breakfast nook in the background.



Second prize in the Laun-Dry-Ette window display contest was awarded to the Weiss Laun-Dry-Ette Shop of Spokane, Wash., on this window. Local tie-in was secured by mentioning Washington wool.

Installing the Display in the Shallow Show Window Spokane Dealer Wins Second Prize in Contest with Window Only Two Feet Deep by Using False Footing for Washer

To the dealer who has a display window of small depth, the record of the Weiss Laun-Dry-Ette Shop, of Spokane, Wash., will serve as a guide. In this case the owner of the establishment secured a location for his store on one of the best streets of the city, and in so doing he had to be satisfied with only a small space. The store itself is located on a corner and is quite small.

In selecting a location Louis Weiss, the manager and proprietor of the store, took cognizance of the general trend of traffic in Spokane. It was his desire to secure a location which would be passed by prospective customers and yet would not be on the main shopping street of the city. His purpose was to secure the best possible location and yet stay away from the high-rent district of the main shopping thoroughfare.

The site which was selected is in the Clemmer Theater Building. This building is one of the most modern in the city and has several small, well-kept shops in the store rooms facing the two streets upon which it is built. The Weiss Laun-Dry-Ette Shop has the corner location in the building and is adjacent to the entrance to the theater. In addition to this, the dealer's store is just across the street from the Davenport Hotel, which is a natural meeting place for people of Spokane. Many small shops of good character are located in the Davenport Building, thus adding to the attractiveness of the location selected by the Weiss shop. The street upon which the store is located is one block above the leading department stores.

To obtain the fullest return from this location the dealer found that he should keep his windows well trimmed so that crowds attending the theater might be attracted to his display. The size of

the shop prevented Mr. Weiss from adding any depth to his display window, and he found it necessary to use false stage work to support the third leg of any washing machine he cared to use in trimming the windows. The greatest depth which could be obtained in the display window itself was 2 ft.

In addition to the fact that the extremely shallow window prevents the use of it as a suitable base for any large display, it precludes the use of any lights except overhead direct fixtures. As the store is adjacent to the theater, provisions must be made for

lighting the display for the evening. Powerful lamps, concealed behind a screen of opaque material, are used to illuminate the displays.

The policy of the shop has been to present displays, featuring the washing machine, electric ironer and cleaner that it retails. Changes are made frequently in order that greater attention may be attracted to the displays.

Although Mr. Weiss has just recently purchased the Laun-Dry-Ette Shop, he entered the window display contest that was conducted by the manufacturer of the washing machine which the company handles. During the contest the shop had four different window displays which were photographed and entered in the contest. In these windows the washing machine was the central figure and various other properties were used to increase the appeal of the window.

The photographs which were sent to the manufacturer won for the Spokane dealer second prize in the contest. The picture of the prize winning window is reproduced herewith as well as one of the other windows submitted in the affair.

A strong local appeal was put into the prize window by the two exhibits of raw material and finished product which can be successfully laundered in the machine. The Port Angeles sheep farm, spoken of in the hand lettered cards, is in the western part of Washington. Display cards furnished by the manufacturing company supplied information concerning the washing machine.

In another window prepared during the contest no effort was made to get any local appeal. The washing machine itself was used as the motive for the display and was accompanied by an electric ironer and the two display cards used in the prize window.

To permit the window trimmer to place the washing machine in the window it was necessary to construct a false footing for the third leg of the machine. This was attached behind the floor of the window and added a sufficient footing to stand the machine in the background of the display.



A false footing had to be provided to support the third leg of the washing machine because of the shallowness of the window. Direct overhead lighting was used to illuminate this contest display.

Proving the Utility of the Modern Electric Range

Manufacturer Cooperates with Pueblo, Colo., Dealers, Newspaper and Foodstuff Merchants to Present Cooking School

"The proof of the pudding is in the eating." According to the Edison Electric Appliance Company, Inc., the proof of the electric range is in its cooking and baking. Because the company believes this, it is carrying on its campaign of presenting cooking schools to the women of the western cities. During last fall cooking schools were conducted in the Pacific Northwest, and since that time arrangements have been made for similar schools in other parts of the West.

The last school that was conducted was presented in Pueblo, Colo. There, in a city of approximately 42,000 people, a cooking school which was open five days, had a total attendance of about 1,300 women. According to the reports of those in charge of the school, after the first day from twenty to fifty women were turned away from the doors at every lecture.

In the Colorado city it was deemed advisable to conduct the series of educational lectures under the auspices of the Pueblo Star-Journal, the local daily newspaper. The cooking school was named the Star-Journal Cooking School and the paper gave whole-hearted support to the entire campaign. J. H. Fiesler, of the Edison Electric Appliance Company, Inc., with headquarters in Salt Lake City, Utah, made the preliminary arrangements for the school. He took an active part with the newspaper men in securing of advertising space from the local dealers and in obtaining the cooperation of the foodstuff dealers in Pueblo.

In preparing for the school a vacant store building in the downtown district of Pueblo was secured and the electric range to be used in the demonstration was placed on a platform and connected to the power company's lines. A kitchen cabinet and a refrigerator, each supplied by local furniture dealers, were located on the platform so that the demonstrator could have her supplies handy. Seats for 225 women were placed in the store. To attract attention to the school two electric ranges were displayed in the show windows. The range to be given as the first prize in the bread-baking contest, the wash-

ing machine, that was to go to the winner of the cake-baking contest, and the vacuum cleaner, the first prize in the pastry division, were displayed in one window. Cards explaining the three articles and the basis for awarding them accompanied the devices. In the other window of the store appeared the second range and the various minor prizes. These consisted of foodstuffs and the like that had been donated by the co-operating merchants of Pueblo.

Advertising for the school started on the Sunday before the scheduled opening. This gave two full days for preliminary announcements before the first lecture was given, as the opening was held on Tuesday. Advertisements consisted of double-page spreads, this space being used from Sunday until the following Friday. In addition to this a large front page news item, concerning the record attendance and interest displayed by the women, appeared in the Star-Journal every day. These news stories helped considerably to keep the cooking school before the public eye.

According to A. R. Wooley, of the Salt Lake office of the Edison company, attendance at the meetings was surprising. The room, with its seating capacity of 225 women, was overcrowded at every lecture except the first one. Many women were turned away daily and Mr. Wooley estimated that each day about forty women stood and lined the walls of the room during the entire lecture. The talk that was presented by Miss B. E. Galvin, of the home economics department of the Los Angeles office, Edison Electric Appliance Company, Inc., lasted about two and a half hours. Interest among the housewives was keen at all times.

In conducting the demonstrations Miss Galvin followed rather a set schedule. As the women entered the room they were given envelopes containing booklets on electric ranges and kindred appliances, a memorandum card with a program pencil attached and a question card. The question card was one which gave the women an opportunity to list any question which they might have. These question cards were deposited in a box as the women left and were

turned over to Miss Galvin so that she might answer the questions on the following day. The cards were headed with: "Miss Galvin, I want to know:" The cards also provided space for the women to write their names and addresses. The guests were also advised to place their names on these cards even though they had no questions to ask, as it was stated that a better record on attendance could be kept.

Through these cards the names of about 700 prospects were secured and one woman wrote on the card, "Please come to our house and sell us an electric range." After the lectures the local range dealers canvassed all of the homes from which question cards had been received.

One of the principal features of the educational campaign was the baking contest, entries for which were received on Saturday, the last day of the school. Three divisions were made in this contest and six prizes were given in each division. All of the articles entered in the contest were later given to orphanages in Pueblo. Interest in the contest was very keen, as can be told from the number of entries. One hundred and sixty-five loaves of bread were entered along with 135 cakes and 96 pies. The range, washing machine and vacuum cleaner shown in the display window of the store were the first prizes in the three divisions.

The results obtained through the cooking school were particularly pleasing to the manufacturer and the electrical dealers in the city. A great deal of interest in electric ranges was aroused and a number of sales were closed immediately. In the two weeks' period following the school thirty ranges of the make used in the demonstration were sold and a number of sales were nearly completed in the same time. It is Mr. Wooley's opinion that about 60 per cent of the names secured through the question box will have to be disregarded as prospects for ranges this year, but he believes that a great many of them will be developed.

The range campaign in Pueblo was conducted primarily for the Southern Colorado Power Company. This company was represented by E. F. Stone, superintendent of light and power sales. Bert Rowley, of the Edison Electric Appliance Company, Inc., with offices in Salt Lake, was one of the leaders in arranging the school.



All of the foodstuffs displayed in this window were given as prizes in the baking contests conducted by the Star-Journal Cooking School, recently held in Pueblo, Colo. The electric range and washing machine awarded as first prizes may be seen in the background to the right.



SOME of the pies, loaves of bread and cakes entered in the baking contest conducted with the Star-Journal Cooking School are shown above. (Center) An electric sign announced the school which was held in a downtown store. In the lower picture Miss Galvin may be seen demonstrating the electric range to the women of Pueblo.





The polar bear being kept cool by the fans suggested to the Denver resident that a fan would cool him also if one were installed in his home. The white floor covering intensified the appeal.

Suggestions Used to Sell Electric Fans in Denver

Window Display of Denver Gas & Electric Light Company Shows Polar Bear Being Kept Cool by New Model Fans

To the small boy going to the Chau-tauqua where he is to hear a brass band play grand opera music, the only pleasure to be derived from the concert, as far as he is concerned, is that obtained while endeavoring to torment the musicians. In preparing for the entertainment, the average boy secures a small stock of lemons and is then ready to occupy one of the front seats in the tent. The results of these preparations are known by everyone. The musicians playing wind instruments, on seeing the small boy suck the lemon, find to their embarrassment that their mouths have begun to water and that their instruments have become filled with saliva. The suggestive powers of the lemon are too great for many musicians and in a number of cases, the small boy finds, to his delight, that the players are forced to stop.

In this prank of the small boy may be found a message for the electrical dealer. He, too, can use the power of suggestion to gain his purpose, but greater thought must be given to the subject than the small boy gives to his trick. In the case of the merchandiser suggestion must be used to convey a thought which will react to the benefit of the person to whom it is applied.

The Denver Gas & Electric Light Company, in cooperation with the Westinghouse Electric & Manufacturing Company, recently installed a window display which had a sales promotion idea backed by suggestion alone. The

window display was designed to stimulate the sale of electric fans and the purpose of the exhibit presented was to suggest, by means of electric fans and the figure of a polar bear, a way to keep cool during the warm weather.

In preparing the display, a picture of which is reproduced on this page, Mr. Littlefield of the Denver Gas & Electric Light Company and Mr. Barrett of the Westinghouse company in Denver, determined to design a window which would present the appearance of a cool spot in the center of the hot sidewalks and streets of Denver. They knew that by showing an animal which was always associated with cold climates, the feeling of coolness would be suggested to anyone seeing the display. Naturally, the passer-by would look for the thing which kept the polar bear cold and on seeing the electric fans, would realize that they would also keep him cool during the hot days.

The bear which was used as the center of the display is 9 ft. 3 in. high, weighed 1,990 lb. when alive and is reputed to be the biggest bear ever killed in Alaska. The Dupler Fur Company, Denver manufacturing furriers, loaned the model to the window trimmers. An electric fan was placed in his paws and six white fans were directed at the animal to "keep him cool."

The idea used by the Denver central station and the manufacturer has proved to be one worthy of mention. Excellent results have been obtained.

A BEHEADING BEE FEATURING "THE OTHER BIDDERS WERE"

By JOE OSIER

Not long since a number of contractor-dealers in a city located much less than a thousand miles from Nowhere—

Were invited to attend a beheading bee staged by a Capitalist and a w. k. architect who were trying to—

Build a \$500,000 office building for about \$250,000.

While the invitation to attend the fracas did not state baldly that the guests were expected to furnish the entertainment, this was implied because—

Each man, whose bid had been opened, tabulated and studied, was asked to shave this item, shade that figure and—

Slash his entire estimate to the marrow. In other words, they were told, individually, that—

If they wanted the contract they would have to take it for the privilege of—

Renewing acquaintance with the working class and wearing out their old clothes.

And so, the Low Bidder and the "other bidders were" came to the party and they conferred—and they smoked cheap torches and drank some alleged B. V. stuff and—

They whittled and deducted from their original estimates and—

Finally, the biggest Goof in the lot walked out of the private office with—

A one-way ticket to the bankruptcy court in the coat of his three-way "unie."

I know the instance I have just cited is nothing new. The same little game is being played wherever buildings are being built and—

The moaning of the sad sucker who slashed is heard to High Heaven and—

Still the little game progresses without police interference and—

Men of the Trade continue inheriting the dizzy heights, the tail-spin and the unprofitable and sickening flop.

And all this occurs in spite of the work of Associations where members are taught to figure costs of doing business, which, necessarily, must include overhead and a fair margin of profit.

And so, today, I arise on my haunches to state that until men engaged in the electrical industry learn that the way to attain material success is not by—

Undermining, knifing, strangling—

There will be no success and—

The owner who challenges bidders to mortal combat, using pencils as weapons, will—

Always be declared the winner.

Conferences may be all O. K.—depending upon the size of the bottle, but—

If I were in the game and were called into conference, I would say:

"There is my figure. It is consistent with good business practices and principles and I'll abide by it. If you can use me and my high-class organization, fine. If not, I'll see you later, but—

"Not at the cleaners."

Now I feel that is the way the game should be played and I'm willing to wager there are thousands of men in the business who feel likewise—therefore—

That being the case, I'm going to pick up the marbles because—I Win.



Special truck purchased by the California Electrical Cooperative Campaign for transporting portable window display about state. F. N. Smith, southern California field representative of the Campaign is shown on the left, while Robert L. Eltringham, the executive manager, is on the right.

Portable Window Display Is Arousing Interest

California Electrical Cooperative Campaign Provides Special Truck for Transporting Exhibit About State

For immediate effects in stimulating the business of central stations and contractor-dealers, the portable window lighting exhibit of the California Electrical Cooperative Campaign, described on page 186 of the March 1, 1923, issue of the Journal of Electricity and Western Industry, has no parallel. To date the exhibit has had eight showings before a total of 2,000 merchants and the amount of business which has been derived is estimated at several thousands of dollars.

In addition the display has aroused national attention. Requests for details as to its construction and method of operation have been received from the Pacific Northwest and from cooperative organizations and large central stations in several eastern cities.

Recently the California Electrical Cooperative Campaign has had built a special truck for transporting the exhibit from city to city. A photograph of the truck appears above. The body of the truck is 6 ft. 3 in. wide and 12 ft. long and has been designed to carry the entire equipment comprising the exhibit. The truck has been painted to attract the major amount of attention in the cities which it visits. The body is a bright yellow and the running gear red. The lettering on the side and back is silver shaded with red and blue. The campaign insignia is green, blue and red.

As described in a preceding issue, the exhibit itself is constructed after the fashion of stage scenery and can be assembled or dismantled in the minimum amount of time. The lighting equipment is most complete and includes a complete trim of the highest quality, to be used in those cities or towns where the proper merchandise

would not be available. It is the usual practice to cooperate with a local merchant, securing from him the material to be displayed in the window at the time of the lecture on proper illumination. In the smaller localities, however, such merchandise is not always obtainable. Consequently material for a complete window trim has been incorporated in the exhibit. This includes draperies, rugs, a screen and several articles of furniture. While in some of the larger cities where the exhibit has been shown a merchant has often displayed merchandise valued at \$3,000 in the window, practically the same effect has been secured with an outlay of less than one-tenth that amount.

The field representative who accompanies the exhibit to the various localities is a regular "jack-of-all-trades," being a chauffeur, stage hand, electrician, lecturer, illuminating engineer and salesman. In the larger cities the lecture is given by an illuminating engineer furnished by one of the manufacturers, but in the smaller places a representative of the Cooperative Campaign does the speaking.

The exhibit has been displayed in the following cities: San Francisco, Oakland, Los Angeles (twice), Whittier, Riverside, Pomona and Pasadena. In Oakland and Los Angeles special programs were prepared under the auspices of the electric clubs, to which the merchants were invited as guests. In other localities the exhibit is displayed before some one of the various merchants' association. It has been found that so general is the interest displayed by the merchants that once the exhibit is shown in one locality the merchants in adjacent cities will often make re-

quests that the same show be staged for them.

**The well lighted store
is the busy store**

Walk down the street any night and look in the stores and at the show windows.

Which store attracts the crowds? Isn't it the one where good window displays are well lighted and where the goods inside are displayed under the light that approaches nearest to daylight?

Good light is a powerful sales magnet. Is it pulling trade *your* way, or to your competitor?

Think this over and then send for a lighting specialist. It costs nothing to find out where your lighting can be improved.

California Electrical Co-operative Campaign

| | |
|--|---|
| 314 Rialto Building San Francisco Douglas 1537 | 516 Detweiler Building Los Angeles Broadway 633 |
|--|---|

A sample of the literature distributed to the merchants at the exhibition of window display.

INDUSTRIAL NEWS



Los Angeles \$35,000,000 Bond Issue Fails to Pass

Proposition No. 6 authorizing the issuance of \$35,000,000 in bonds for the Bureau of Power and Light of the City of Los Angeles, Calif., failed to receive the necessary two-thirds vote in the municipal election June 5. Complete returns from 859 precincts out of a total of 862 showed 41,264 votes for the issue and 38,319 against the measure. While receiving a slight majority the bonds lacked more than 11,000 votes for final approval.

The proposition called for \$10,000,000 for improvement and extension of the present municipal distribution lines within the city and \$25,000,000 for the generation of power at Boulder Canyon on the Colorado River and the transmission of this power to the city. It is believed that the reference to Colorado River power caused the defeat of the measure as the \$10,000,000 appropriation for improvements and extensions was vitally needed. Opponents of the measure pointed out that development of the Colorado River was outside the province of the city and was at least five years in the future.

Five other bond issues on the municipal ballot carried at the election. They were:

Proposition No. 1.—\$7,500,000 for purchase of site and erection of a City Hall.

Proposition No. 2.—\$500,000 for the purchase of site for extension to public library.

Proposition No. 3.—\$15,000,000 Harbor Improvement bonds.

Proposition No. 4.—\$2,000,000 for construction of viaducts and flood control.

Proposition No. 5.—\$1,500,000 Playground bonds.

Proposition No. 7.—To allow the Los Angeles Electric Railway to build a subway terminal underneath Pershing Square in the heart of the business district received a large majority.

Power Company Orders Turbines for Mystic Lake Plant

Contract for furnishing two 7,500-hp. impulse turbines for the Mystic Lake plant, has been awarded to the Pelton Water Wheel Company of San Francisco by the Montana Power Company. The new power house is to be built in the gorge of the Rosebud River, in the Beartooth Mountains, 43 miles from Columbus, Mont.

The turbines which have been ordered are of the single runner, single nozzle type and are to operate under an effective head of 1,050 ft. They will be equipped with auxiliary relief nozzles

and direct motion governors. The contract includes two hydraulic cylinder operated valve gates to be installed at the power house and a butterfly valve to be placed at the head of the penstock. The butterfly valve will be equipped for electric motor and hand operation and will embody direct and remote control features.

Preliminary work on the pipe line grade and penstock line was started some time ago and the company plans to have this work completed by August. Work on the power house itself will not begin until this preliminary work is completed.

Last fall the road which had to be built by the company to enable it to transport materials to the dam was completed to a spot within three-quarters of a mile of the dam site. Work has been progressing on this road during this spring. It is reported that a railroad will be constructed along the pipe line grade to provide service for hauling dam materials.

The Mystic Lake plant when completed will stand the company an investment of about \$1,000,000 and will enable it to serve the southern part of the state more efficiently. It is planned to have the first unit completed by the fall of 1924.

League of Southwest Discusses Colorado River Projects

Plans for the development of the Colorado River were among the subjects discussed at a conference held by the League of the Southwest at Santa Barbara, Calif., June 7-9. The principal speakers on this topic were Robert Sibley, publicist and engineer of San Francisco; W. G. Clark, consulting engineer of New York City, and George H. Maxwell, of Phoenix, Ariz., executive director of the National Reclamation Association.

Mr. Sibley, after interviewing practically all of the leaders in the states interested in the development of the river, presented a paper covering the problems of developing the river. Mr. Clark, representing a group of Philadelphia capitalists, outlined plans for a proposed power development at Boulder Canyon. The plans propose the development of about a million horsepower. The project would require a dam 1,000 ft. high.

Mr. Maxwell's paper covered a preliminary study of a high line canal serving Arizona and southern California. The project would provide irrigation for a part of the Imperial Valley in California and a portion of Arizona. It would also be possible to develop approximately a million horsepower under this proposal.

Federal Power Commission Halts Action on Applications

The Federal Power Commission has recently announced that action on several applications has been suspended until certain surveys have been completed. Among these are the application of the Rocky Mountain Power Company for a permit for a project on Flathead River below the outlet of Flathead Lake in Montana. This involves development of 270,000 hp. The Commission desires to await the report of a commission that is investigating the Columbia Basin Project. The Commission consists of Assistant Secretary of the Interior Goodwin and R. P. Davis, director of the Reclamation Service. The applications of the Utah Power & Light Company and that of James B. Girard for projects on the Colorado River were also placed on the table to await action on the Colorado River compact.

The Commission has officially granted to the Mount Shasta Power Corporation, a subsidiary of the Pacific Gas & Electric Company a license for 50 years for Pit No. 3, and one for 2½ years for Pit No. 4. A preliminary permit has been granted to the Murtaugh Irrigation District for a period of 3 years for a project on Snake River and Rock Creek, located on public lands in Twin Falls and Jerome Counties, Idaho. The district plans the development of approximately 13,740 hp.

Announcement has been made by the Commission of the receipt of three applications for power projects in the western states. The Construction Company of America is seeking a preliminary permit to construct a dam in the Mokelumne River, in Amador and Calaveras Counties, California, with a tunnel 1½ miles in length, leading to a power house in the basin of Dry Creek. A second dam will be built in Dry Creek, creating a large reservoir which will serve to restore the flood waters of the Mokelumne River for irrigation use. C. W. Thuringer has made application for a preliminary permit to develop four small projects in the vicinity of Ward, Boulder County, Colorado. About 3,000 hp. will be developed on South St. Vrain Creek and Left Hand Creek.

The City of Denver, Colo., has made application for a preliminary permit for a proposed project in the North Fork of the South Platte River, in Jefferson County, about 20 miles west of Denver. The project will consist of a pipe line about six miles long leading to a power house. This project will constitute one unit of an extensive program which the city has under consideration.

National Superpower Survey Is Subject of New Book

Of recent years two important superpower surveys have been made of various sections of the United States, one in the Boston-Washington district and the other in the Pacific Northwest. A much larger survey, nation-wide in its scope, has just been completed by Frank G. Baum, San Francisco consulting engineer. In his "Atlas of the U. S. A. Electric Power Industry" (McGraw-Hill Book Company, Inc.), Mr. Baum has divided the country into twelve regional districts all of which would be connected by 220,000-volt lines to obtain the greatest possible benefits from diversity, service, insurance, etc.

The purpose of the book as explained by the writer in the introduction was the collection of facts of the power resources and the power demands of the United States, in order to have a basis for analyzing the situation and determining what is the best solution for the power problems of the country. Mr. Baum calls attention to the various economies which might be effected from such a superpower system, not only in the "banking" of the power facilities but also in the equalization of the power resources, resulting in a distribution of population and industries not otherwise possible. He points out the savings which might have been effected if the railroads could have followed a definite

plan of construction from the beginning and urges the power industry to adopt some such plan before the time is too late.

Every phase of such a plan is entered into by Mr. Baum in his book. He discusses power markets and makes his recommendations upon sound observations. The charts and plates are intensely interesting and contain information of great value.

Mr. Baum's book is a very valuable and far-sighted contribution to the art and economics of electric power transmission and will well repay close study and application.

The San Francisco Association for the Blind, is endeavoring to raise \$97,000 for the purpose of purchasing the building in which the association has a factory, and a small lot adjacent to the building. If the money is raised the organization will build a warehouse on the small lot and will continue the manufacture of reed furniture, brushes, etc., in the building which it now occupies. This organization employs about 50 blind persons at present and if the addition is made will be able to use a larger number of employees. The reason for purchasing the site is that the owner of the building refuses to lease the building at the old rental and the new charge is said to be excessive.

General Electric Company Plans Broadcasting Station

Faith in the permanence of radio broadcasting is demonstrated by the announcement of the General Electric Company that the first plant to be constructed exclusively for popular broadcasting will be erected in Oakland, Calif. to house the large Pacific Coast station of that Company.

Work will be started this month on a two-story building, the antenna towers and the power house. Workmen are already assembling the radio equipment. It is expected that the new station will be in the air within six months.

Martin P. Rice, director of broadcasting for the General Electric Company, will direct the operating policy of the station and Dr. Thomas Addison, manager of the company's interests on the Pacific Coast for the past thirty years will have supervision of the plant. The station will be located on East 14th Street, Oakland, adjacent to the new General Electric Company factory building.

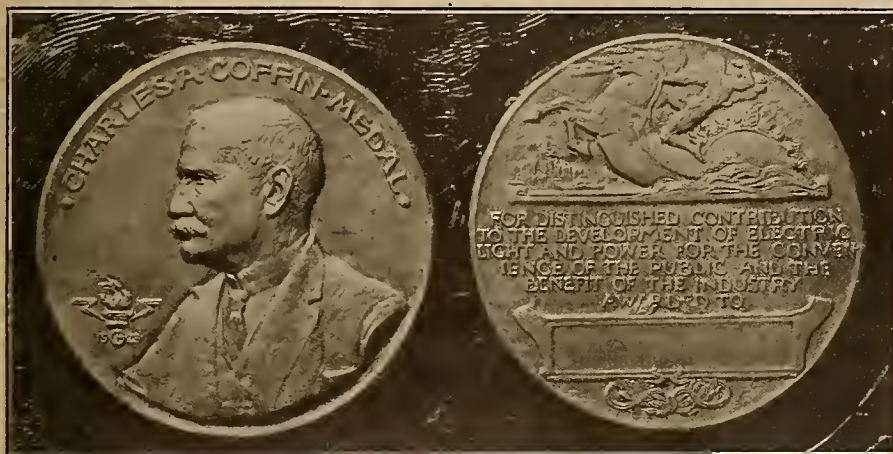
The plans provide for a two-story brick structure. On the first floor will be the office of the studio manager, a general correspondence room, a reception room for artists and quarters for motor-generator sets and storage batteries. There will be two studios on the second floor, the main studio large enough to accommodate large bodies of musicians such as a band or symphony orchestra, and a smaller studio from which solo numbers and addresses may be broadcasted. The use of two studios will make possible continuous broadcasting. Research is now being carried on to determine the reverberating qualities of the ideal studio in order that the proper amount of dampening may be secured in the Oakland studio to assure maximum musical quality.

One thousand feet back of the studio building will be the power house and antenna system. The antenna will be multiple-tuned and strung between two steel towers built by Pacific Coast Steel Company, each 150 ft. high and placed 260 ft. apart. Beneath the antenna proper will be the counterpoise consisting of a network of wires, 14 ft. above the ground, covering an area of 150 x 300 ft.

The transmitting set will be similar to that which is now used at WGY, Schenectady, N. Y. The developments which have been made in this station will be part of the Pacific Coast station equipment. The apparatus is now being manufactured in the Schenectady works of the General Electric Company and will be tested there.

The Pacific Coast station will be operated at 1000 watts but the equipment will be designed in excess of that power for purposes of conducting tests. In operating high-powered equipment below normal rating in broadcasting, tubes and rectifiers are not subject to occasional overloads and, as a result, superior quality and greater reliability of transmission are obtained.

The Pacific Coast station of the General Electric Company will utilize "remote control" to broadcast church services and musical entertainments from San Francisco and Oakland. The Pacific Telegraph & Telephone Company has offered to provide land wire connection for this type of service.



Reproduction of the Coffin Medal awarded to the Southern California Edison Company.

Southern California Edison Co. Awarded Coffin Medal

The Southern California Edison Company, Los Angeles, was presented on June 7 with the gold medal of the Charles A. Coffin Foundation, offered for the first time last year, to the electric public utility company of the United States which made the most notable contribution during the year to the development of electric light and power service. This is the first award of the medal to be made by the Foundation, which was created by the General Electric Light Company. The recipient was selected from eighteen electric light and power companies which submitted their year's records for consideration, and the decision is understood to have been extremely close.

The presentation of the medal was made during the meeting of the Public Policy Committee of the National Electric Light Association which was hold-

ing its annual convention in New York. Frank W. Smith, of New York, president of the association and chairman of the association's Charles A. Coffin prize committee, officially presented the medal, which was accepted by John B. Miller, president of the Southern California Edison Company.

The award of the medal was accompanied by the presentation of a check for \$1,000 to be applied to the employees' benefit fund of the Southern California Edison Company, under the terms of the Foundation.

The Charles A. Coffin Foundation was established by the board of directors of the General Electric Company in December, 1922. It constitutes a tribute to Charles A. Coffin, who retired that spring after forty years of association with the electrical industry, this period including the founding by him of the General Electric Company, of which he was the leader for thirty years.

Program for San Francisco Convention Announced

Will Hold Meeting of Seventh Annual Convention of Pacific Coast Electrical Association at Fairmont Hotel

Of outstanding importance on the program of the sixth annual convention of the Pacific Coast Electrical Association to be held at the Hotel Fairmont, San Francisco, June 19-22, 1923, is the Western Development Conference which will be held on Friday, the closing afternoon of the convention. Included among the speakers will be Governor Friend C. Richardson, California, Governor James G. Scrugham, Nevada, Governor Charles Mabey, Utah, Willis Booth, president of the International Chamber of Commerce, A. C. Hardison, president, California State Farm Bureau, Paul Shoup, vice-president, Southern Pacific Railway, and D. M. Botchford, vice-president, Columbia Steel Company.

This conference is expected to be one of the most noteworthy ever sponsored by the association.

The complete program for the convention follows:

PROGRAM

1923

Tuesday, June 19

Morning

- 9:00 a.m. **REGISTRATION.**
All members are requested to register for themselves and their guests immediately upon arrival.
- 12:00 Noon. San Francisco Development League will hold its regular weekly luncheon at the Fairmont Hotel, following a special Electric Vehicle program. All members and guests are invited to attend.

Afternoon

BUSINESS SESSIONS OF TECHNICAL AND COMMERCIAL SECTIONS

Technical Session:

L. J. Moore, chairman, presiding.

Executive Engineer, San Joaquin Light & Power Corporation.

- 2:00 p.m. 1. Report of Apparatus Committee.
2. Special Paper by J. E. Woodbridge on Induction Regulators versus Synchronous Condensers for Distribution Circuits.
3. Special Paper by H. Michener on 220-kv. Apparatus.
4. Report of Prime Movers Committee.
5. Report of Power Factor Committee.
6. Special Paper by O. A. Knopp on Kva. Demand Meters.

Commercial Session:

Don C. Ray, chairman, presiding.

Manager, Electric Sales Dept., Pacific Gas & Electric Company.

1. Opening, including announcements, and Chairman's Address.
2. "Possibilities in the Electric Vehicle Field—An Opportunity Overlooked by the Electrical Industry," by A. M. Frost.
3. Meeting of Committee Chairmen of Commercial Papers.
- Evening
- 8:30 p.m. Showing of Publicity Committee's film on Power Development.
- 9:30 to 12 M. Dancing (informal), Rainbow Lane.

Wednesday, June 20

Morning

BUSINESS SESSION

- 9:30 a.m. General Business Meeting.
Address of Welcome, by Hon. James Rolph, Jr., Mayor of San Francisco.
President's Report.
Address, by Carl D. Jackson, Counsel N.E.L.A., New York City.
General Committee Reports.
General Business Session.
Appointment of Nominating Committee.

Afternoon

BUSINESS SESSIONS — TECHNICAL AND COMMERCIAL SECTIONS, 2 p.m. to 5 p.m.

BUSINESS SESSIONS—ACCOUNTING AND PURCHASING & STORES SECTIONS, 2 p.m.

Technical Session:

L. J. Moore, chairman, presiding.

- 2:00 p.m. 1. Report of Hydraulic Power Committee.
2. Special Paper by R. J. C. Wood on Water Hammer.
3. Special Paper by R. A. Monroe on Friction Tests on Penstocks.
4. Report of Meter Committee.
5. Report of Underground Committee.
6. Special Paper by N. B. Hinson on Underground System, S.C.E. Co.
7. Special Paper by M. O. Bolser on 35,000-volt Cable Installed in Los Angeles.

Commercial Session:

Don C. Ray, chairman, presiding.

- 2:00 p.m. 1. "Merchandising Electric Ranges" by Herbert Cram.
2. "Domestic and Commercial Data on Cooking, Water and Air Heating," by J. Wrenn.
3. "Industrial Electric Heating," by E. B. Criddle.

Accounting Session:

C. P. Staal, chairman, presiding.

2:00 p.m. General Session.

Purchasing & Stores Session:

C. A. Kelley, chairman, presiding.

2:00 p.m. General Session.

Wednesday, June 20

ENTERTAINMENT

- 9:30 a.m. Automobile Trip for all registered lady guests around San Francisco, visiting Twin Peaks, Golden Gate Park, the Cliff House, etc., returning to hotel at 1 p.m. Those desiring to go, please notify Registration Committee not later than Tuesday evening.
- 3:00 p.m. Shopping Tour of principal Department stores, returning to hotel at 4:30 p.m. Those desiring to attend, please notify Registration Committee not later than Wednesday noon.
- 8:30 p.m. Dancing (informal) in Rainbow Lane.

Thursday, June 21

Morning

BUSINESS SESSIONS OF TECHNICAL AND COMMERCIAL SECTIONS.

Technical Session:

L. J. Moore, chairman, presiding.

- 9:00 a.m. 1. Report of Safety Rules Committee.
2. Report of Overhead Systems Committee.
3. Special Paper by H. A. Barre on Line Operation at 220,000 Volts.
4. Special Paper by W. J. Canada, Director of Engineers, N.E.L.A.
5. Report of Inductive Co-ordination Committee.
6. Representative of California Railroad Commission will be present to join in discussion.

Commercial Section:

Don C. Ray, chairman, presiding.

- 9:00 a.m. 1. "Field of Commercial and Residential Lighting," by R. S. Prussia.
a—"Business Possibilities of Residential Lighting."
b—"Office Building and Flood Lighting."
c—"Industrial Illumination."
d—"Show Window Lighting."
e—"Lighting of Retail Stores."
f—"Electric Sign and Billboard Illumination."
2. "Existent Conditions in Modern Communities Make Adequate Street Lighting a Necessity," by H. H. Sandoval.
3. "Domestic Electric Refrigeration," by H. C. Rice.

There will be no afternoon sessions of the Convention on Thursday.

ENTERTAINMENT

- 9:00 a.m. Automobile Trip of East Bay District for all registered lady guests. Leave San Francisco via Key Route Ferry at 9:40 a.m. Special Key Route train will be provided from the Key Route pier to Claremont Hotel, where automobiles will meet the party, driving through East Bay territory, visiting Skyline Boulevard, University of California, etc. Luncheon will be provided at Claremont Country Club; party to be returned to San Francisco not later than 4:30 p.m.

- 12:00 Noon. Kiwanis Club luncheon at Hotel Fairmont. All members and guests of the Convention are invited to attend.

Golf:

- 1:00 p.m. Registered delegates and guests are invited to enter the Golf Tournaments to be held on the famous links of the San Francisco Golf and Country Club.

Tennis:

- 2:00 p.m. A Tennis Tournament will be held on the Grace Cathedral courts, corner Sacramento and Taylor Streets, San Francisco. Prizes will be awarded. This tournament is open to men only. All entrants must register with Committeeman R. R. Cowles before Thursday morning. List will be provided at the Registration desk.

Evening

- 8:30 p.m. Grand Ball (formal) with Special Features. Fairmont Hotel Gold Ballroom. (Admission by ticket provided at Registration.)

Friday, June 22

Morning

GENERAL BUSINESS MEETING

- 10:00 a.m. Business Session and Conference. Address by M. H. Aylesworth, Executive Manager, N.E.L.A., New York City.
Transaction of all Unfinished Business.
- 12:00 Noon. "California Forward" Meeting—California Development Association. All delegates and guests are invited.

Afternoon

Western Development Conference:

A. Emory Wishon, presiding.

- Vice-President and General Manager, San Joaquin Light & Power Corporation.
2:00 p.m. Opening of the Conference by Governor Friend C. Richardson, State of California.

Responses:

Governor James G. Scrugham, State of Nevada.

Governor Charles Mabey, State of Utah.

Address: "The Development of the West as a National Economic Necessity," by Willis Booth, President International Chamber of Commerce, and Vice-President Guarantee Trust Company, New York City.

Address: "The Agricultural Phase of Western Development," by A. C. Hardison, President California State Farm Bureau.

Address: "Transportation as a Factor in Western Development," by Paul Shoup, Vice-President Southern Pacific Company.

Address: "The Steel Industry as a Basic Industry in the Development of the West," by D. M. Botchford, Vice-President and General Manager of Columbia Steel Company.

Evening

- 6:30 p.m. Banquet—Main Dining Room. John A. Britton, Toastmaster. Vice-President and General Manager, Pacific Gas & Electric Company. Addresses by men prominent in Industry, Commerce, and Finance.
- 10:00 p.m. Polyphase Pageant of Progress to be presented in Main Ballroom. (Admission by ticket provided at Registration.)
- 10:30 p.m. Dancing (informal).

SPORTS AND TRIPS

10:00 a.m. Ladies' Putting Contest in the lobby of the hotel. No handicap. Three prizes to be awarded to those having best scores. All entrants must register at Registration desk with Committeeman Arthur Rowe not later than Thursday noon.

2:30 p.m. Special trip through Chinatown for registered lady guests. Those desiring to make the trip, please assemble at Registration desk.

Saturday, June 23

SPECIAL POST-CONVENTION OUTING TRIP

A special trip to Mt. Tamalpais and Muir Woods will be arranged, provided seventy-five

(75) persons indicate their desire to make this famous trip. Mt. Tamalpais, situated on the north shore of San Francisco Bay, with Muir Woods at its base, is one of the beauty spots of Northern California.

Trip No. 1.—Leaving San Francisco 9:45 a.m. via Northwestern Pacific ferry, arriving summit of Mt. Tamalpais 11:45 a.m. Luncheon at the Tavern. Leave Mt. Tamalpais 1:45 p.m., arriving Muir Woods 2:23 p.m. Leave Woods 4:30 p.m., arriving San Francisco 6:35 p.m. Rate for the entire all-day round trip, including luncheon at Tavern, \$4.93.

Trip No. 2.—Leaving San Francisco same time as Trip No. 1, and leaving Mt. Tamalpais at 1:46 p.m., returning direct to San Francisco, arriving at 3:35 p.m. Rate for the trip, including luncheon at the Tavern, \$3.73.

cisco Electrical Development League and the Electric Transportation Association will hold a joint meeting at luncheon at the Fairmont Hotel. This meeting will be attended by the delegates to the convention of the Pacific Coast Electrical Association. The electric truck will be the main topic of the day, as a truck will be on exhibition and the main speaker will address the meeting on this subject. Slides illustrating applications will accompany the talk.

The Electric Transportation Association is cooperating with the San Francisco Development League by joining with that body. An overflow meeting of the Transportation Association and the Development League was held on June 11, at which time members of the former made a very effective plea to all branches of the electrical industry to support and encourage the electric truck development. It was pointed out at that meeting by the speaker for the Association that the electric truck investment in the metropolitan district of New York totals \$23,000,000, and that the annual saving to users of electric trucks over other kinds of transportation amounts to \$6,900,000. The 4,666 electric trucks in New York City consumed during the past year approximately 27,000,000 kw-hr. with a revenue of over \$1,000,000 to the central stations.



The California Baking Company has been operating this electric truck equipment in San Francisco with marked success.

Electric Truck Parade to Be Held in San Francisco

Street Parade Will Be Opening Event of Annual Convention of Pacific Coast Electrical Association on June 19

Over 75 electric trucks will parade up Market Street in San Francisco at noon on June 19 as the opening event of the annual convention of the Pacific Coast Electrical Association. This parade, which will be headed by Acting Chief of Police Mooney, will have in line electric trucks from the fleets of the large truck users of the city. Included in the firms entering trucks are the following: the Old Homestead Bakery, the California Baking Company, the National Ice Cream Company, the Emmons Draying

Company, Pacific States Electric Company, General Electric Company, Pacific Gas & Electric Company.

The parade has been arranged for by the Electric Transportation Association. R. C. Griffin of the Pacific Gas & Electric Company, who has been actively in charge, has arranged to have banners attached to the trucks calling attention to the features of the electric truck, such as savings in transportation costs, long life, dependability and durability.

Following the parade the San Fran-

Annual Northwest Convention Is to Convene on June 27

The Sixteenth Annual Convention of the Northwest Electric Light & Power Association will be opened at the New Washington Hotel in Seattle, Wash., on June 27. The first session of the four-day meeting will be held at 9:30 a.m. on that day and at that time N. W. Brockett, president of the association, will deliver the President's Annual Address. General sessions of the association will also be held at 2 p.m. and at 8 p.m. on the same day.

Concurrent sessions of the four sections of the association will be held on June 28, the meetings starting at 9:30 a.m. and at 2 p.m. Presiding officers for the sections will be as follows: Public Relations Section, George L. Myers; Commercial Section, Lewis A. Lewis; Accounting Section, George F.



The fleet of electric trucks operated by the Old Homestead Bakery. Twenty-four electrically driven trucks are used by this firm in San Francisco.

Nevins; Technical Section, R. M. Boykin.

In the evening of the second day a "Splash Party" will be held at the Crystal Pool. Only delegates and guests of the convention will be admitted to the pool and balcony.

Arrangement has been made to transport the delegates to Victoria, B. C., on the morning of June 29. The trip will be made by Canadian Pacific steamer and the association members and their registered guests will leave at 9:30 a.m., arriving at Victoria at 1:30 p.m. During the stay in Victoria the visitors will be entertained in a number of different ways. Automobile trips have been arranged as well as golf tournaments. An informal dinner dance will be given at the Empress Hotel, which is to be the headquarters while in Victoria. The return to Seattle will be started June 30 at 4:30 p.m. and the party will disembark at 9:30 that evening.

All of the meetings of the association will be held at the New Washington Hotel in Seattle, except the executive session which will be conducted at the Empress Hotel on the evening of June 29. Hotel reservations can be made by addressing the Hotel Committee, Northwest Electric Light and Power Association, 406 Electric Building, Seattle, Wash.

Announcement of Reorganization Made by Majestic Company

Announcement of the purchase of the plant, equipment and good will of the Majestic Electric Development Company by the Majestic Appliance Company, Inc., has recently been made. The latter company will continue the manufacture of Majestic heaters and appliances at the San Francisco factory.

The personnel of the Majestic Electric Appliance Company, Inc., is as follows: A. T. Burch, president; T. M. Simpson, vice-president and general manager; H. H. Daley, sales manager; and E. W. Botts, auditor. According to the announcement the entire Majestic line has been redesigned and has added to the line of air heaters and pancake and waffle irons.

Canadian Power Company Is Host to Municipal Officials

The manager and staff of the British Columbia Electric Railway Company recently entertained the Vancouver city council and the mayors and reeves of the surrounding municipalities at a dinner given at the Stave Lake Plant of the company. The occasion of the dinner was the visit of Sir Ernest Maes Harvey, one of the London directors of the company. Three dams which will total approximately 1,000 ft. in length and ranging from 50 to 75 ft. high are being erected at the Stave Lake site.

George Kidd, general manager of the power company, informed the guests that present work was giving employment to about 275 men and that the work would be finished in September at a cost of more than \$1,000,000. The work is being done to assure maintenance of the present supply of power rather than to increase it. This will be done by storing water to be used during the dry period in the fall and winter.

With regard to the company's future plans, Mr. Kidd said that at present the Stave Lake plant develops 52,000 hp.,

the Lake Buntzen plant 84,000 hp., and the auxiliary steam plant, Vancouver, 17,000 hp., making a total of 153,000 hp. The company proposes to raise this to 268,000 hp. by erecting a 120-ft. dam in a narrow gorge and by connecting Alouette Lake and Stave Lake by a tunnel, 3,900 ft. in length. This work and the installation of the necessary machinery will cost in the neighborhood of \$10,000,000 and it will be done gradually, as the demand for power in the vicinity increases. It may be ten years, or even more, before these plans are consummated.

Voluntary Rate Reduction Offer Made by Power Company

The Montana Power Company has recently requested the Public Service Commission of Montana to permit it to take a voluntary reduction in rates. The action comes in answer to a citation to show cause why there should not be a substantial reduction in rates.

The new schedules which the power company offers to put into effect for itself and affiliated companies provide a reduction ranging from 2 cents per kilowatt-hour for the first 100 kw-hr. used in private households to 4 cents per kilowatt-hour for all additional power over 150 kw-hr. used for domestic purposes.

The Public Service Commission has announced that it is studying the reductions offered in the filing and if the reductions are accepted the new rates will go into effect July 1. The new domestic rate would be as follows:

- First 25 kw-hr., 8 cents.
- Next 25 kw-hr., 4 cents.
- Next 100 kw-hr., 3 cents.
- All additional, 2 cents per kilowatt-hour.

Officers for New Year Elected by Seattle Engineers

At the regular monthly meeting of the Seattle section of the American Institute of Electrical Engineers, the election of officers for the coming year was held. The meeting was held May 23 in the Telephone Building, Seattle, Wash.

The section elected the following officers: Charles Lund, superintendent of distribution of the Tacoma municipal light department, chairman; Joseph Hellenthal, superintendent of distribution for the Puget Sound Power & Light Company, Seattle, secretary. Mr. Lund succeeds C. F. Terrell, and Mr. Hellenthal succeeds E. S. Code.

During the meeting the engineers were addressed by Clifford E. Mong, transmission engineer of the Pacific Telephone & Telegraph Company. Mr. Mong's talk dealt with a typical installation of a telephone long distance toll cable. Charts, curves and diagrams were used to illustrate the address.

The Pacific States Electric Company has recently taken over the exclusive distribution for the Chance line of anchors, manufactured by the Chance Company of Centralia, Mo. This arrangement is the outcome of a recent trip to the Pacific Coast, of A. Bishop Chance, president of the company bearing his name. The Chance line of products will come under the direct supervision of H. R. Noack of the Pacific States Electric Company.

Colorado Springs Company Loses in Fight for Franchise

By a vote of nearly four to one, the voters of Colorado Springs, Colo., have refused to grant another 25-year franchise to the Colorado Springs Light, Heat & Power Company, at a special election held on June 12. Eight hundred and sixty-six votes were cast in favor of regranting the franchise and the vote against the proposition totaled 2,948.

The present franchise of the company expires Sept. 8. In view of the fact that General Goethals has made a report stating that the city could not develop sufficient hydroelectric power economically it is not known whether a counter proposition will be offered the company by the city or whether a franchise will be granted some other utility company. Municipal ownership is yet possible.

The index for Volume 50 of the Journal of Electricity and Western Industry has been prepared and is ready for distribution to subscribers. Copies of the index can be secured by addressing the circulation manager of the Journal of Electricity and Western Industry, 531 Rialto Building, San Francisco, Calif.

Books and Bulletins

PRESENT DAY PENSTOCK DESIGN

Report of Hydraulic Power Committee, N.E.L.A. Prepared by Hydraulic Committee, Pacific Coast Electrical Association. Paper. 8¼ by 11 in. 80 pages. Illustrated. 55 cents. National Electric Light Association, 29 West 39th St., New York.

Recent advance and improvements in penstock design, especially with reference to high head installations such as are typical of western development, form the principal item of discussion in the report of the Hydraulic Power Committee recently adopted at the annual convention of the National Electric Light Association. The work of compilation has been done in the West by the Hydraulic Power Committee of the Pacific Coast Electrical Association under the direction of H. C. Doolittle, assistant chief engineer of the Southern California Edison Company.

The body of the report covers features of each company's experience in the design and operation of penstocks and constitutes information of great value to other companies considering similar problems. It is a symposium of the latest improvements and advancements in penstock design and construction. Many phases of the subject are covered in an unrelated fashion and the report would be more valuable if it were properly indexed. Manufacturers and trade names are used indiscriminately and no favoritism is shown. The statements of manufacturers are interesting and are in keeping with the spirit of the report which is to bring out the latest developments in the subject.

From the standpoint of past committee reports, this one sets a new high standard. The illustrations and tables are particularly valuable and no space has been wasted on non-essentials. As a reference work on penstock design, the report fills a long-felt need.

Meetings

Electric Club of Los Angeles Takes Part in Parade

The week of May 21 was celebrated as "Better Music Week" in Los Angeles, and was ushered in by a spectacular parade on the evening of Saturday, May 19. In this parade were various types of floats and automobiles, decorated with flowers and bunting, while some of the floats were magnificently decorated and arranged with papier maché models, such as the ones entered by the Bureau of Power & Light, the combined florists of the city and some of the various music houses.

The Electric Club was well represented with a float which was gaily decorated with flowers and various colored lights. This float consisted of a high truck on which was mounted a 350-hp. Fiat gas engine, directly connected to a 100-kw. generator which produced the electric current used to illuminate the lights and for the two large searchlights which followed on either side of the truck on trailers.

The searchlights were 40 in. in diameter and two of the largest in the West, they being capable of producing 2,500,000 cp. for each lamp. These caused a considerable amount of attention as they came down Broadway, flashing down the streets and on adjacent buildings. On top of the truck was mounted an illuminated sign with the words "The Electric Club."

The equipment that was used was furnished by Otto K. Olsen, of the Illuminating Company, of Hollywood, and was assembled by Mr. Olsen. The committee responsible for the Electric Club's showing in this parade consisted of: G. E. Arbogast, H. F. O'Brien, E. R. Northmore, H. F. Rea, Otto K. Olsen, and H. B. May, Jr.

California Rivers Are Subject of Power Board Survey

The Federal Power Commission recently authorized the creation of an interdepartmental board for the study of certain streams in California. The governor of California has been requested to appoint a member to the board.

The board has been created for the purpose of giving consideration to various problems and for recommending to the Commission what manner or plan of development will in its judgment be the best adapted to a comprehensive scheme of development in the interests of the people of California. The board will consist of D. C. Henny, U. S. Grant, III, and E. W. Kramer.

The board will consider three separate cases and will make individual reports on each subject covered. The three reports will be made on, the best scheme of development of the American River and its tributaries above Folsom; the proposed diversion of the waters of the Trinity River into Sacramento Valley for power and irrigation purposes; and the best scheme of development of the North Fork of the Stanislaus River.



Members of the electrical industry in the San Francisco Bay region on the hurricane deck of the ferry Hayward. The vessel is the first turbo-electric ferry boat ever constructed.

San Francisco Bay Men Guests on Turbo-electric Ferry

Members of the San Francisco Electrical Development League, the Electric Club of Oakland, and the Engineers' Club of San Francisco, to the number of about 500, were the guests of the San Francisco Oakland Terminal Railways Company on board the ferry Hayward on May 28. The railway company

tween San Francisco and the Key System Mole as soon as it is completed. The Hayward has been in service during the rush hours since June 1.

Substation Is Visited by Utah Electrical Engineers

The Utah section of the American Institute of Electrical Engineers made its last meeting for the 1922-23 season the occasion of a very interesting trip to the Terminal substation of the Utah Power & Light Company, situated about 7 miles west of Salt Lake City. The meeting was held on the evening of May 31. Dinner was served in the substation building.

Following the dinner a business meeting was held to consider the matter of enlarged activities of the Engineering Council of Utah and the election of officers. The meeting was presided over by C. C. Pratt.

The recommendation of the nominating committee for officers for the ensuing year was unanimously adopted and officers were elected as follows: chairman, C. R. Higson; secretary-treasurer, Hiram W. Clark; C. C. Pratt, P. P. Ashworth, A. M. Bohnert, J. A. Kahn, Wm. M. Scott, members of the executive committee.

After adjournment of the meeting the remainder of the evening was spent in an inspection of the Terminal substation yard and buildings. The entire trip was very successful, and it is the intention of the Utah section to conduct such an inspection trip as the final meeting for each year in the future.

The American Electrochemical Society will hold its next meeting in Dayton, Ohio, Sept. 27-29. Round table discussions on important subjects will be held during the meeting. Several important papers relating to electrochemistry will also be read at that time.

The Custer County Electric Company, which is to build and operate a power plant at Westcliffe, Colo., has been incorporated by C. B. Beardsley, George L. Beardsley, and Leo C. Mercier.

COMING EVENTS

- Pacific Coast Electrical Association—
Annual Convention—San Francisco, Calif.
June 19-22, 1923
- Northwest Electric Light and Power Association
Annual Convention—Seattle, Wash.
June 27-30, 1923
- Rocky Mountain Division—National Electric Light Association—
Annual Convention—Glenwood Springs, Colo.
Sept. 17-19, 1923
- Colorado Public Service Association—
Annual Convention—Glenwood Springs, Colo.
Sept. 17-19, 1923
- American Institute of Electrical Engineers—
Pacific Coast Convention—Del Monte, Calif.
Oct. 2-5, 1923

took the electrical men for an hour and a half trip around San Francisco Bay, serving luncheon en route.

The guests were permitted to visit any part of the new electrically driven vessel. The Hayward is the first turbo-electric ferry boat ever constructed and the operating machinery was particularly interesting to the visitors. Two General Electric motors of 1,200-hp. capacity each are installed in the vessel, one in each end. The aft motor drives the boat while the forward motor operates at slower speed. A turbine connected to a direct current generator of General Electric manufacture, delivers current at 3,000 volts for operating the driving motors. The motors are direct connected to the propeller shafts and operate at 125 r.p.m. The speed of the new boat is about 15 m.p.h.

The San Leandro, a sister ship of the Hayward, will be put on the run be-

Personals

Eli F. Bush, formerly connected with the sales department of the Los Angeles office of the Western Electric Company, has resigned to join his twin brother in the practice of law in that city. Mr. Bush has been with the Western Elec-



ELI F. BUSH

tric Company for the past two and a half years and before coming to Los Angeles was in the Philadelphia office of the Westinghouse Electric & Manufacturing Company. Mr. Bush is a graduate of the University of Michigan. Upon completing his course he entered the Pittsburg works of the Westinghouse Company, going to the Philadelphia office after finishing the apprentice course. The study of law has been confined to spare time and Mr. Bush gives credit to John J. Gibson, present vice-president of the Westinghouse Company, for inducing him to take up this spare time work. He took the California bar examinations in January and was admitted to practice in March. Mr. Bush and his brother are responsible for the mock trials which have been conducted by the Western Electric Company and the S & H Service Electric Company of Alhambra with such success. Mr. Bush will retain his membership in the Los Angeles Electric Club.

Walter J. Conlon and Fred E. Hazard, officials of the Conlon Electric Washer Company, along with Enoch B. Seitz, secretary of the Washing Machine Manufacturers' Association, all with headquarters in Chicago, recently took a vacation trip to Colorado, spending most of their time in Colorado Springs.

H. J. Gundlach, general manager, and George Lowe, purchasing agent, of the Mine & Smelter Supply Company, in Denver, have gone East on their semi-annual "shopping" tour. They attended the Electrical Supply Jobbers' Association convention in Virginia and spent considerable time at the Westinghouse headquarters in Pittsburgh.

Sidney B. Paine of the Boston office of the General Electric Company is a recent Pacific Coast visitor.

R. G. Gentry, commercial manager of the Denver Gas & Electric Light Company, and his family are visiting Los Angeles, San Francisco and other Pacific Coast points.

H. D. Randall, manager of the General Electric Company in Denver, entertained Robert Sibley, consulting editor of the Journal of Electricity and Western Industry, at a dinner in that city May 19, while en route east in the interests of development of the Colorado Basin. A number of Rocky Mountain utility men were guests of the occasion.

W. H. Griffin, topographic engineer for the United States Geological Survey, is in Salt Lake City to take charge of the several survey parties to go out into Boxelder, Tooele, Utah and Salt Lake Counties for surveys incident to the making of topographic maps. The survey is to be made on a cooperative basis between the counties and the federal government, each furnishing an equal share.

V. L. Board, general superintendent of the Denver Gas & Electric Light Company, has been appointed a member of the industrial development board of the Denver Civic & Commercial Association by its newly elected president, Elais M. Ammons, former governor of Colorado.

Ely C. Hutchinson, vice-president and general manager of the Pelton Water Wheel Company, has returned to San Francisco from a month's business trip in the East. Mr. Hutchinson spent most of his time at Philadelphia, the headquarters of Wm. Cramp & Sons Ship & Engine Building Company, associate of the Pelton Company, where he conferred with H. B. Taylor, president of the Pelton Company, and with other officials of the Cramp Company. He also visited the New York office of the Pelton Company.

Jerry O'Connell, formerly construction superintendent with the Pacific Gas & Electric Company, is now electrical engineer for the Modesto Irrigation District at Modesto, Calif.

Leo J. O'Brien of the electrical heating and cooking department of the Pacific Gas & Electric Company of San Francisco, was a recent Los Angeles visitor.

S. Herbert Lanyon, sales engineer of San Francisco, together with Mrs. Lanyon, left on May 26 for an extended trip to the Atlantic seaboard, and while in New York will attend the convention of the National Electric Light Association.

Roy L. Anderson, Sacramento district representative for the California Corrugated Culvert Company, has been promoted to the position of sales manager for the Los Angeles territory of the company.

W. S. Rosplock, formerly connected with Westinghouse Electric & Manufacturing Company, Los Angeles, and in charge of their publicity work in that section prior to the first of the year, is now with the Pacific Manufacturing & Electric Company, manufacturers of the Everhot water heater, in the capacity of salesman and field representative.

W. A. Alden, industrial lighting specialist of the Westinghouse Electric & Manufacturing Company, Los Angeles office, is in the East visiting the South Bend works of that company, formerly the George Cutter Company.

Clare N. Stannard, R. G. Gentry and George W. Bixler, officials of the Denver Gas & Electric Light Company, are among those on a committee of prominent business men in Denver who have launched a campaign to raise the balance of \$100,000 required for the municipal tourist bureau advertising fund.

J. C. Thompson, assistant treasurer of The California Oregon Power Company, has been spending a short time at Riddle and Myrtle Creek, Ore., endeavoring to complete arrangements for the extension of the power line to connect those towns with the main power line operated by the company. Efforts are being made to secure the right-of-way and as soon as this is obtained, work of construction will be started. The company hopes to have the power ready for use by the towns by the first of June.

Clifford E. Mong, transmission engineer of the Pacific Telephone & Telegraph Company, addressed the May meeting of the Seattle section, A.I.E.E. on "A Typical Installation of a Telephone Long Distance Toll Cable," illustrating his talk with charts and diagrams.

C. R. Higson, assistant to the general superintendent of the Utah Power & Light Company, at Salt Lake City, has been elected chairman of the Utah section of the American Institute of Electrical Engineers. The election took place at the section's meeting on May 31. Mr. Higson graduated from the University of Wisconsin in 1907, and immediately thereafter became associated with the General Electric Company at Schenectady, N. Y., where he remained for about a year and a half. He then became instructor in electrical engineering at the University of Wisconsin until 1911. During that year he entered the employ of the Utah Light & Railway Company at Salt Lake City, and the following year, when the Utah Power & Light Company was organ-



C. R. HIGSON

ized, he became identified with its engineering and operating department. He now holds the position of assistant to the general superintendent of that company. Mr. Higson was born in Salt Lake City, and secured his early education in the schools there. He is an enthusiastic worker, and takes a very keen interest in Institute activities and electrical engineering matters in general.

H. J. Mayo, southern California representative of the Benjamin Electric Manufacturing Company, has just returned from an extensive trip in the East where he visited the main plant of his company at Chicago.

V. G. Fullman, sales manager of the Steel City Electric Company, Pittsburgh, Pa., manufacturers of Fullman floor boxes, conduits and steel outlet boxes, recently spent several days in Los Angeles, with their local representatives, Allied Industries, Inc.

J. E. Krilly, district line material specialist, of the San Francisco office, Western Electric Company, was a recent Los Angeles visitor. Mr. Krilly has just returned from the East and while in Los Angeles was engaged on several jobs with the Western Electric Company representatives in that city.

E. E. Carpenter, member of the firm of Baker & Carpenter, consulting engineers, San Francisco, has been made chief engineer of the British Columbia Electric Railway Company, Ltd., Vancouver, B. C. Mr. Carpenter is a graduate civil engineer from Stanford University with the class of 1898. For seven years following his graduation he practised railway engineering with the Southern Pacific, Western Pacific and Nevada Northern railways. He was chief construction engineer for Sander-son & Porter in the installation of the Stanislaus River power development for the Sierra & San Francisco Power Company. He supervised the Jordan River development of the British Columbia Electric Railway Company and was chief engineer for Sander-son & Porter on the Victoria, B. C., water supply development. Mr. Carpenter was chief civil engineer of the Panama-Pacific Exposition and during the war was chief engineer and manager of the Sander-son & Porter ship building project at Raymond, Wash. More recently he was executive engineer and project manager of the Stanford Stadium,



E. E. CARPENTER

which has a seating capacity of 60,000, and at the present time is a member of the California Memorial Stadium Commission, which is supervising the construction of an athletic stadium at that university with a seating capacity of 72,000. Mr. Carpenter is a member of the American Society of Civil Engineers and the American Association of Engineers.

John D. Isaacs, consulting engineer for the Southern Pacific Company and one of the leading figures in the world of railroad engineering, has retired from active service. Mr. Isaacs is credited with being the inventor of the device which marks the birth of the moving picture industry.

F. E. Johnson, Jr., vice-president of the M. W. Kellogg Company of Jersey City, is in San Francisco on one of his periodical trips in connection with the various lap-welded steel pipe installations that the company is making for Western power companies. While in San Francisco Mr. Johnson is making his headquarters with the Pelton Water Wheel Company, Pacific Coast representatives of the Kellogg Company.

Herbert Nunn, former state highway engineer of Oregon, was appointed general manager and engineer of the Contractors' Association of Northern California on June 4. As chief engineer of the Multnomah County (Ore.) system of highways and as state highway engineer of Oregon, Mr. Nunn has, during the past eight years, been in charge of the Oregon state highway system, including the Columbia River highway. The membership of the Contractors Association is composed principally of general contractors engaged in state, county and city highway and other heavy construction in Northern California. Its head office is in San Francisco.

W. C. Finely, erecting engineer for the Pelton Water Wheel Company, is at Ocean Falls, British Columbia, where he is installing a 6,300-hp. Pelton double-overhung reaction turbine at the power plant of the Pacific Mills, Ltd. The new turbine is of the same general design as the three Pelton units installed for the company four years ago. These have a capacity of 8,700 hp., which, when the new turbine is installed, will give a total of 15,000 hp., supplying all the power required for the company's pulp and paper mills.

J. I. Colwell, Seattle manager of the Western Electric Company, attended the annual convention of the National Electric Supply Jobbers Association held in Hot Springs, West Virginia, May 23-26. After this convention, Mr. Colwell went to New York City to attend the annual convention of the National Electric Light Association. Mr. Colwell will be away from Seattle for about 30 days.

Gerard Swope, president of the General Electric Company, arrived in Salt Lake City on May 24, and spent several days in that city. On the evening of May 24 Mr. Swope was the guest of honor at a dinner given at the Alta Club by Robert Miller, local manager of the General Electric Company. In a brief address Mr. Swope called attention to such projects as the proposed American Falls, Idaho, reservoir and the Boulder dam in the Colorado river as projects that will mean the development of a vast amount of electricity for the west. He predicted considerably more railroad electrification and countless other uses to made of the cheap electric power which would thus be developed. Governor Charles R. Mabey and Lafayette Hanchett also made brief addresses. Robert Miller acted as toastmaster.

Harry L. Pearson has been made engineer of the distribution department of the El Paso Electric Railway Company, in charge of the distribution system of that central station. Mr. Pearson was born in Pocatello, Ida., coming to El Paso in 1907. He was graduated from Massachusetts Institute of Technology in 1922. Upon his graduation he was commissioned second lieutenant, Coast Artillery O.R.C., and is at present assigned to the 508th Anti-aircraft Regiment. He entered the employ of the El Paso Electric Railway Company in



HARRY L. PEARSON

1922 as a meter tester. He was later promoted to assistant superintendent of distribution, and he has just recently been made distribution department engineer for the company.

P. H. Booth, sales manager of the Edison Electric Appliance Company, with headquarters at that company's factory at Ontario, Calif., has been elected to the Board of Freeholders of the City of Los Angeles which is charged with framing a new charter for that municipality.

Dan Harley, formerly with the Montana Power Company in Butte, has been made manager of the Deer Lodge Electric Company at Deer Lodge, Mont.

L. B. Reynolds, civil, hydraulic and sanitary engineer, has been appointed professor of civil engineering at Stanford University to succeed C. D. Marx, who has resigned and who now becomes emeritus professor. Mr. Reynolds is a graduate of Stanford and is a noted figure in the engineering world.

H. B. Cannon, formerly electrical superintendent of the Napa district for the Pacific Gas & Electric Company has been transferred to Modesto as general foreman.

J. C. Masek, theatre switchboard engineer, of the Westinghouse Electric & Manufacturing Company, East Pittsburgh works, has been in Los Angeles for several weeks investigating theatre switchboards installed in the local theatres, and planning new switchboards for theatres under construction, with the local Westinghouse switchboard engineers, R. C. Stackhouse and H. S. Warren.

H. D. Crain and Charles C. Holmes have recently joined the Los Angeles office of the Western Electric Company and are in the sales force as specialty appliance salesmen.

Manufacturer, Dealer and Jobber Activities

The P. A. Geier Company, manufacturer of the Royal cleaner, has announced that through the activities of its Los Angeles jobber, California again leads in a sales contest being conducted by the company. Listenwalter & Gough are the Los Angeles jobbers for the manufacturing company. Five of the ten leading contestants are Californians and the Pacific Coast has twenty-two of the first sixty positions.

The Apex Electrical Distributing Company, Cleveland, Ohio, has sent out to its dealers an illustrated booklet describing and showing the advertisements to be run in the national magazines in advertising Apex-Rotarex products. The booklet also shows advertisements of which electro-plates have been made and which are available for dealers who wish to tie-in their advertising with the national campaign.

The Cooper storage battery is now being stocked by the New England Electric Company in Denver, according to a recent announcement of that company.

The Edison Electric Appliance Company is refitting its San Francisco sales office which is located at 155 New Montgomery Street. The company intends to make quite an elaborate show room, displaying heavy duty bake oven equipment and electric ranges in addition to the appliance line that has been shown in the past.

The Westinghouse Electric & Manufacturing Company has issued Leaflet No. 1867, which describes electrical equipment for coke plant machinery. Illustrations of the uses of electricity in byproduct plants are shown with recommendations as to the various types to be used.

The Square D Company, Detroit, Mich., has recently introduced a new vacuum tube socket for radio sets. The new socket accommodates a four-pronged tube and can be mounted either horizontally or vertically. The device is made of black porcelain.

Charles Weaver has started an electrical contracting and repair business at 1709 East 38th Street in Los Angeles, Calif. Mr. Weaver will specialize in motor installation and maintenance as his establishment is located in the industrial center of Los Angeles.

The Electric Power Equipment Corporation, Philadelphia, Pa., has recently announced that increased business has made it necessary for the company to move its factory to a new and larger building. A completely modern building is now being used by the company as a location for its factory, where high tension equipment is manufactured. The new address of the company is 412 North 18th Street, Philadelphia.

Betts & Betts Corporation has recently published Radio Bulletin No. 188, which supersedes Bulletin No. 180. The bulletin contains complete description and illustrations of the radio equipment manufactured by the company. The console cabinets, which the company is introducing, are described at considerable length.

Hobart Brothers Company, Troy, Ohio, has recently published three leaflets describing HB constant potential battery charging sets manufactured by the company. Details concerning operation of the sets are given in the leaflets.

Listenwalter & Gough, electrical jobbers of Los Angeles, Calif., have moved to new headquarters at 819 East First Street.

The Colonial Lighting Fixture Company, of Portland, Ore., has been using an inexpensive means of keeping its name before the public. The company purchased from a printer small blotters which are of extremely attractive design. A river scene, reproduced in two colors, appears on the blotter, and space is left for the name of the company, along with an announcement of the line that is carried by it. The blotter is small and is a good one to send to women customers.

The Manhattan Electrical Supply Company, Inc., New York, has prepared two leaflets describing the dealer-aids that have been prepared for dealers who are handling Red Seal batteries. Illustrations of display racks and suggested window trims are contained in the folders.

The Line Material Company, South Milwaukee, Wis., has designed a new petticoat insulator especially adapted for breaking street lighting circuits. Both grooves on the new insulator are $\frac{3}{4}$ -in. in diameter and the leakage distance between grooves is 2 in. The new insulator takes the place of special break arms or the regular 8,000-volt petticoat insulator and two strain insulators.

The C. F. Pease Company, Chicago, Ill., has recently placed on the market a new machine for drying blue prints, negative prints and all kinds of photographic prints. The device known as the Pease sheet dryer can be heated electrically and is operated by a $\frac{1}{8}$ -hp. motor.

Sangamo Electric Company, Springfield, Ill., has issued Bulletin No. 61 which gives instructions for the installation and repair of Sangamo Type-H single and polyphase watt-hour meters. The bulletin is well illustrated and the text is particularly clear.

The Rogers Electric Laboratories Company, Cleveland, Ohio, has issued a folder describing its new model "Rogers-Quality" hotplate.

The Driver-Harris Company, Harrison, N. J., has recently published Data Book R-23. The bulletin is entitled "Alloys for Electrical Resistance." It contains up-to-date information concerning the various alloys used for heating elements in electric heaters of all kinds. Resistances of all of the various alloys manufactured by the company for wire making are given and graded according to wire sizes.

The Hurley Machine Company, Chicago, Ill., is placing on the market a new electric vacuum cleaner to be manufactured under the trade name Hurley Thor No. 77 electric brush type cleaner. One of the features of the new cleaner is the driving mechanism provided for rotating the brush. The brush in the new appliance is driven by phosphor bronze and hardened steel gears, a friction clutch being used to eliminate the danger of stripping gears. A self-adjusting nozzle is another feature of the cleaner. A $1\frac{1}{7}$ -hp. General Electric motor is used to drive the suction fan.

The Rome Wire Company, Rome, N. Y., has recently published a new price list on its line of cords and wire cables. The company's product is known as Super Service Cord and cable.

Altorfer Brothers Company, Peoria, Ill., has published a small booklet, for retail distribution, entitled, "The A. B. C. of Wash-Day." The attractive piece of literature contains a detailed description of the A. B. C. line of home laundry equipment, including washing machines and ironing devices.



Judging from the smiles emanating from the faces of the Apex-Rotarex department members of the North Coast Electric Company, one would say that business is exceedingly prosperous in Seattle, Wash. These men and women were all so busy "peddling" and servicing their wares that it was with difficulty that the photographer prevailed on them to "take time-out" to have their picture taken. Harry Byrne, president of the North Coast Electric Company, which operates stores and shops in Seattle, Portland, Tacoma and Spokane is standing to the left of the washing machine, with his hand on the control.

Trade Outlook

San Francisco

A large amount of construction is under way in the San Francisco Bay region, but the erection of large apartments has abated some. In the report of the Federal Reserve Bank, it is stated that the demand for certain raw materials such as lumber and metals "is not so insistent" as it was at the first part of the year. The stocks of lumber in retailers' hands have increased some and there is a tendency to purchase for immediate needs.

There are indications of a slackening of business in general despite the fact that the volume of business continues large and sales are considerably in excess of last year. There are evidences of buyers avoiding price advances and that they are expecting price declines.

Manufacturing continues active, with several additions to the assembly plants of the district. Several firms have recently located warehouses in San Francisco and Oakland in order to better supply the needs of the section.

There is little if any involuntary unemployment and wages are higher in the farming and fruit-growing sections. Industrial labor is also receiving a good scale.

Intercoastal and foreign shipping is continuing to hold up. Bank clearings show a considerable increase over last year.

Los Angeles

Los Angeles building records for May totaled 5,184 permits with a valuation of \$18,926,881. This closely approaches the figures for March of this year which hold the record for any single month in the history of the city. The total for the first five months of 1923 is 24,584 permits with a valuation of \$78,814,739. This is almost equal to the entire year of 1921 when the final check-up showed \$82,000,000. During May there were permits taken out for seven factories, valuation \$2,215,591, and 21 industrial buildings, \$121,743.

Los Angeles clearing house smashed all records in May with a total of \$539,795,391.80. This is \$161,012,528.12 in excess of the total for May of 1922, when the month's business was \$438,772,763.68. The closest approach to May this year was made in March when the total was \$579,770,678.

The value of imports and exports at Los Angeles Harbor totaled \$5,246,416 in May, according to estimated figures released yesterday at the office of Collector of Customs. This total is \$1,707,554 in excess of the total of import and export values for May, 1922.

An indication of the optimism prevailing in Los Angeles is shown by the result of the election on June 5, when the voters authorized the issuance of \$26,500,000 in bonds for public improvements. The \$35,000,000 power bonds for the Bureau of Power & Light failed to get the necessary two-thirds vote, however they received a majority vote.

The electrical industry has been receiving a fair portion of the increased business in the city and is in a good condition. Contractors have been kept busy installing up-to-date wiring in the buildings and homes being erected.

Salt Lake City

The advent of summer weather in this section has been rather backward, which has had some effect upon general business. Industrial activity, especially mining, continues to increase, and with the summer building activity now well under way, merchants and business men generally are looking forward to a busy season.

Agriculturists in this section have a prosperous year ahead, in the opinion of recent investigators of crop conditions. Increased production in most all agricultural products is predicted.

In the mining field new properties are being opened up, and in some localities mining activity is greater than it has ever been. A marked increase is noted in the use of electric power in mining, and during the past few months several new installations have replaced steam-operated equipment.

Electrical jobbers continue to report conditions as very much improved compared with last year. Retailers are devoting considerable effort to the sale of appliances, with good results.

Credits and collections are better than for some time past. Employment is being furnished to a considerable number of people, both in skilled and unskilled labor, and there seems to be a continuous demand for men in the mining districts. There is practically no unemployment.

Postal receipts show that conditions have been improving throughout the past year. It is expected that the improvement will continue until fall, at least.

Denver

A new high record in building permits was established during May, with a total of \$3,024,800, thanks to the issuances made on the last day of the month, which included the million dollar hospital and medical school of the University of Colorado. For the first five months of 1923 building activities have shown an increase of \$2,046,450 over the corresponding period of the previous year.

There is a marked improvement in both basic industries and trade although weather conditions have retarded farm operations. In mining, production of lead and zinc ores has been maintained at near war-time records. Silver mining is somewhat unstable owing to the approaching expiration of the Pittman act. Bituminous and lignite coal production is running ahead of last year. Petroleum output is the heaviest ever recorded.

Generation of electric power is rising and central stations report satisfactory outlooks with several exceptions. Ap-

pliance trade is not brisk while vacuum cleaner business is good. Washing machines are moving gradually. Owing to cool weather there has been little demand for fans as yet. A good range business is reported out in the state.

Portland

Reports from the principal lumber manufacturing centers show that lumber is being produced at an increasing rate, the production of lumber for the week ending May 28 being 23 per cent above normal. During the same week there was a slight falling off of orders, which is attributed to the fact that dealers, who until now have had difficulty in supplying the trade, are now well stocked. The slackening of the building construction in many parts of the country because of excessive building costs, has also had its effect.

Large lumber operators have expressed the opinion that lumber prices may be forced to a lower position. No intimation has been made as to when any decline may be expected. The opinion is that any reduction will be a small one.

Building records for May of this year showed a small loss over the same month of 1922, but the total for the year to date is slightly ahead of last year. About 45 per cent of all building is for residence purposes. Construction work is going on in all parts of the city and there is some scarcity of skilled labor.

Bank clearings for May for all Portland banks totaled \$158,524,239 which was 25 per cent gain over May of last year. The increase is largely due to greater activity in the lumber industry.

The electrical jobbers report some improvement in collections.

Seattle

The month of May building activities record showed permits issued for more than \$1,500,000 of new work, and this, with the heavy volume of building now under way, places the construction program for the city in good condition. Reports from various parts of the state indicate a slight dropping off in building, but this condition has not obtained in Seattle, and no marked let-up is predicted until late in the fall.

Deposits are holding up well, business and industry making no unwarranted demands for credit extensions, and a general tone of optimism is prevailing among the banking fraternity. Public work of all kinds, especially street and highway construction, has been very heavy all spring.

The satisfactory volume of work carried on by the electrical contractor-dealers during the spring and early summer is holding up and is expected to be maintained until well into the fall months. Prices of electrical equipment, devices and materials are still increasing, and it is believed the peak is yet to be reached. At present, there is a shortage of iron conduit, and little relief is expected before late in the summer. Heavy constructional programs by telephone companies and power companies in this district have created an active demand for outside construction material. Seattle contractors are now engaged in preparing estimates for wiring on the proposed new Olympic Hotel, the wiring work costing well over \$100,000.

Construction News

Bridges

Calif., Martinez—The Contra Costa County Board of Supervisors has awarded a franchise to the Delta Bridge Company for the construction of a bridge across the San Joaquin River between Sherman Island, Sacramento County, and a point four miles above Antioch in this county. According to the specifications the bridge will be 3,675 ft. long with a 200-ft. draw and will be of the low level type, being only 12 ft. above the water at high mark. The cost will be \$600,000. Under the terms of the franchise the bridge will revert to the counties of Contra Costa and Sacramento at the expiration of the franchise period of twenty-five years.

Calif., Hanford—The Board of Supervisors has awarded the contract for building the 210-ft. reinforced concrete bridge across the North Fork of the Kings River, on the Lemoore-Browndale highway, to Nate Lovelace, on his bid of \$22,408.80. The county will furnish the cement, separate contract for which was given the Deacon Lumber Company.

Calif., Shellville—Davidson & Nicholson, Stockton, submitted low bid for constructing reinforced concrete bridge of two 40-ft. girder spans, with necessary pier, abutments and wing walls over Arroyo Seco Creek near Shellville, Sonoma County.

Wash., Kelso—Contracts for rebuilding of the Yale-Yacolt and Yale-Cougar bridges over Spelie Creek in the Upper Lewis River country have been awarded to Albert Burcham, who is also building a bridge over Owl Creek on the Shanghai Highway.

Wash., Okanogan—Bids will be received until June 25 by the Okanogan County Commissioners for constructing a five-span concrete arch bridge across the Okanogan River at Omak. The structure will be 408 ft. long, with a 20-ft. roadway, and 5-ft. sidewalks, and will involve 142,000 lb. of reinforcing steel, 13,000 ft. of piling and 2040 cu. yd. of concrete.

Wash., Everett—All bids for the construction of a new span across the Stillaguamish River, estimated to cost \$60,000, were rejected by Snohomish County Commissioners, and new bids will be called. Low bid was that of Union Bridge Company, Seattle, \$64,879. Structure will be 210 ft. long.

Wash., Aberdeen—City council recently passed an ordinance providing for a \$150,000 bond issue for a new bridge over the Wishkah River, which will be submitted to voters at early election.

Wash., Ellensburg—Union Bridge Company Seattle, received the contract for a new steel bridge across the Yakima River near Cle Elum, on its bid of \$49,897.

Wash., Chehalis—Contract for the proposed new 220-ft. steel bridge to be built at Bremer by the Lewis County Commissioners, has been let to Monson & Trierweiler, Portland, for \$23,292.

Wash., Seattle—King County Commissioners awarded contract for Mercer Island bridge in King County to J. R. Wood, Seattle on his bid of \$43,990.

Buildings (Industrial)

Calif., Berkeley—A concrete factory is being erected by the Built-in Fixture Company at Parker Street and San Pablo Avenue. Site and building will cost \$35,000.

Calif., Tulare—Southern California Edison Company has completed arrangements for the purchase of a lot on L Street, between Tulare and King Streets for the site of a \$20,000 garage

age, store room, and office building, which the company proposes to erect to house the local branch. J. R. Haskins is manager of the local office. The building will be 86 x 100 ft. of brick and concrete construction, similar to other buildings the company is erecting in outlying towns.

Calif., Oakland—Plans and specifications for the first unit of the Victor Talking Machine Company's \$750,000 plant on the 10-acre tract on Seventy-seventh Avenue, south of East Fourteenth Street, are completed and construction work, it is expected will be started in the near future.

Calif., Los Angeles—Actual construction work has begun this week on the first building unit of the Pioneer-Pacific Worsted Mills Company, according to an announcement made at the general offices of the company. The plant will be on a site of 25 acres near Central Avenue, adjoining the Watts-Redondo line of the Pacific Electric, facing 108th Street. The worsted mills buildings will cost in the neighborhood of nearly \$1,500,000. The main plant will be 225 ft. by 550 ft. in size. The company will employ 450 workers.

Calif., Los Angeles—Architects Walker & Eisen, 325 Pacific Finance Building, are preparing plans for a 2-story and basement factory building to be erected at Vernon for the Hoyt Heater Company. Dimensions, 100 x 125 ft., brick walls, reinforced concrete frame and floors, steel sash, composition roofing, metal skylights, elevator.

Calif., Los Angeles—Architects Corwin & Merrill, 3981 W. 6th Street, are ready for subfigures for erecting a brick factory building, on Santa Fe Avenue for A. B. Rice. Foundation 110 x 60 ft., pressed brick facing, composition roofing, cement floors, metal skylights, wood trusses, wire glass.

Calif., Los Angeles—Frank D. Chase, Inc., engineers, 533 Title Insurance Building are completing plans for a 6-story, Class A industrial building, to be erected on Downey Road, Central Manufacturing District, for the Los Angeles Central Manufacturing District. Reinforced concrete construction, 6-story and basement, U-shape, 260 x 160 x 140 x 90 ft., 10-story tower, brick exterior, walls, terra cotta trim, concrete and maple floors, composition roofing, tower to contain 150,000-gal. water pressure tanks, freight and passenger elevators, sprinkler system, steel sash, steel rolling doors. Concrete and brick work to be done by day work, bids on all subcontracts to be taken next week.

Calif., Los Angeles—Joseph F. Rhodes, 414 Central Building, has prepared plans and will erect a 4-story and basement brick factory building on Imperial Street, between 6th and Jessie Streets, for Pacific Coast Biscuit Company. Dimensions, 120 x 134 ft., brick walls, structural steel, face brick, plate glass, steel sash, composition roofing, metal skylights, fire escapes, elevator, wood and cement floors, \$130,000.

Calif., Los Angeles—Hamm & Grant, Inc., 607 Ferguson Building, have prepared plans and will erect a 1-story factory building on Orange Street, south of Santa Monica Boulevard, for A. J. Braasch Heater Company. Dimensions, 45 x 150 ft., wood frame, corrugated iron exterior and roofing, wood trusses, steel sash, cement floors.

Calif., Los Angeles—Architect Albert C. Martin, 430 Higgins Building, is preparing plans for a 3-story and basement Class A factory and warehouse building, to be erected on E. 7th

Street, near Utah Street, for Wm. Wolker Furniture Company. Dimensions, 100 x 247 ft., reinforced concrete construction, steel sash, composition roofing, metal skylights, 3 elevators, steel rolling doors, sprinkling system.

Calif., Los Angeles—Weymouth Crowell Company, 2026 W. 9th Street, has been awarded a contract for all work complete for erecting a 3-story and basement class A mercantile building, at 8th and San Pedro Streets for United States Rubber Company. The building was designed for a 5-story. Richard D. King, 519 Van Nuys Building, architect. Dimensions, 142 x 122 ft., reinforced concrete construction, plaster exterior, brick trimmings, plate and wire glass, steel sash, elevator, spiral chutes, dumb waiter, gas heating, \$200,000.

Wash., Tacoma—The Terminal Lumber Company, here, plans the purchase of a 30-acre site, on which will be erected a modern re-sawing and re-manufacturing plant to serve inland sawmills. Plant will employ 200 men.

Wash., Vancouver—Northwestern Equipment Company of Seattle has leased a 6-acre site here, which will be used to establish a branch plant, for the manufacture of logging trucks. The site includes the old plate mill of the Standfer Shipbuilding Yards, which will be remodeled and equipped with manufacturing machinery.

Wash., Seattle—The Pacific Telephone & Telegraph Company will construct a 1-story addition to its garage, and a 2-story garage and repair building at 806 Fairview Avenue, at a total cost of \$150,000. The addition will be 129 x 163 ft., of concrete and steel.

Wash., Morton—The Stinson Lumber Company plans the construction of a sawmill near Morton, where the company has a 25-year supply of timber. In addition, a townsite will be developed for the accommodation of the plant's 100 employees.

Wash., Olympia—The veneer plant of the Henry McCleary Timber Company here was recently destroyed by fire, with loss of \$200,000. Plant will be rebuilt.

Buildings (Miscellaneous)

Calif., Lodi—Theater—A. Salomon has announced that he will build a theater here at a cost of \$175,000.

Calif., San Francisco—Terminals—L. R. Lurie has closed a deal with the Pickwick Corporation and the Pacific Auto Stage Lines, whereby ground has been leased for a period of 99 years, located on the southeast corner of Fifth and Jessie Streets, running through to Mission Street. A fireproof depot will be erected containing three floors and basement, the entire area of which will be approximately 60,000 sq. ft. Plans approved by Charles Wren of the Pickwick Corporation and Floyd Hanchett of the Pacific stage lines are the result of close study of the most modern depots in the United States. The entire fleet of cars operated by the two companies can be handled at this terminal. Construction work will start within a few weeks.

Calif., San Francisco—Apartments—Daniel McKillop is planning the erection of an apartment structure on Geary Street west of Hyde, to contain five stories and basement; cost is estimated at \$75,000.

Calif., Fullerton—Theater—George H. Amerige, local pioneer, has had plans prepared for a modern theater building, 70 x 140 ft., 2-story, seating 1,300, which he plans to erect on a site east of the present Orange County Ignition Works. Cost, approximately \$200,000.

Ore., Portland—Apartments—A 2-story apartment house costing \$100,000 will be erected at the corner of 18th and Everett Streets by the Evermun Investment Company, according to the announcement made by J. P. Parker, president of the concern. The structure will cover a site 100 x 100 ft. and will contain four 3-room

apartments and twenty-two 2-room apartments. All will be equipped with electric ranges.

Ore., Portland—School—The Beaumont School is being planned by C. L. Goodrich, Abington Building, and is to cost approximately \$175,000. It will be of brick and concrete construction, having 12 class rooms, assembly hall and manual training and domestic science rooms.

Ore., Portland—Church—The new Central Presbyterian church, costing \$60,000, is to be of cement with stucco exterior and red tile roof. The location is East 32nd and Ankeny Streets, and the structure will be 3 stories in height of the Spanish-California mission style. F. Mason White is the architect.

Ore., Astoria—Stores—Offices—A 2-story and basement structure, 75 x 125 ft., costing \$75,000, is being planned by Knighton & Howell, architects, United States National Bank Building, Portland. This is to be known as the Miller Jeffers Building and is to be located on 14th Street between Duane and Exchange, and is for stores and offices.

Ore., Astoria—Hotel—Plans have been prepared by William Bruce, Portland architect, for a 3-story hotel building to be erected for Thomas Randles on 20th Street between Commercial and Duane Streets in Astoria. The structure will have a ground floor space 120 x 50 ft., and will be of fireproof construction, the exterior walls faced with brick. There will be 25 rooms on each of the two upper floors.

Ore., Portland—Apartments—John H. Grant is preparing plans for a 4-story apartment house to be built on Glisen Street between 20th and 21st for the Commodore Investment Company. The building will cost about \$250,000 and will cover a ground area of 90 x 139 ft. The walls will be of reinforced concrete faced with stone tone stucco. The design will follow the Spanish mission type; each floor will have 14 apartments, the majority of these being three rooms each. Another apartment house costing \$100,000 is being planned by Charles W. Ertz, and will be located at 11th and Everett Streets. The details of the erection are being handled by Metzger-Parker Company. The building will be 100 x 100 ft. and will contain four 3-room apartments and twenty-two 2-room apartments, all of which will be equipped with electric ranges and other modern improvements.

Ore., Salem—School—The Salem high school is to have a brick addition 100 x 72 ft., 3 stories in height. There will be 14 class rooms in the addition at an estimated cost of \$60,000. The plans were prepared by Fred H. Legge, Salem architect. W. H. Burghardt, the clerk of the Salem school district, is managing the bids.

Ore., Salem—Gymnasium—Trenchell & Parelins of Portland have received the contract for the erection of the new gymnasium in the Willamette University campus. The cost of the building will be approximately \$75,000. Actual work on the structure has started; the building is to be 2 stories in height, of brick, and will be modern in every particular.

Wash., Seattle—Federal Building—Warrack Construction Company has been awarded contract for construction of a reinforced concrete federal building at Cordova, Alaska, to cost \$90,000. The building will include a postoffice, court house and city jail.

Wash., Seattle—Hotel—Following bids were opened June 1 by building committee of the Community Hotel Corporation, Seattle, for the construction of the proposed Hotel Olympic. Grant Smith Company, Henry Building, Seattle, low, at \$3,254,000; Amsterdam Building Company, New York City, \$3,453,000; A. W. Quist & Company, Seattle, \$3,535,652; Sound Construction & Engineering Company, Seattle, \$3,538,521; Dougan & Chrisman, Seattle, \$3,456,255, and Rounds-Clist Company, Seattle, \$3,535,652. All bids were considerably in excess of the estimates of Architect J. Otis Post of New York

City and Architect Chas. H. Bebb, of Bebb & Gould, Seattle, who are associated on the project. According to announcement made shortly after the bid opening, an additional million dollars' worth of bonds will be sold immediately to cover cost of the structure which, it is now estimated, will cost between three and one-half million and four million dollars. C. J. Smith is chairman of the executive committee of the board of directors.

Wash., Spokane—Lodge—A labor temple costing \$75,000 is to be erected here. A. W. Johnston, chairman of the board of trustees.

Wash., Seattle—Office—The Cowley Estate will erect a 4-story fireproof addition to the business block at 1413 Fourth Avenue, to cost \$80,000.

Wash., Tacoma—Seminary—The Annie Wright Seminary, here, plans the construction of a home to cost \$600,000, to be ready for occupancy by September, 1924.

Wash., Seattle—Apartments—C. F. Martin, Seaboard Building, has the contract for erecting a 3-story and basement, brick veneer apartment building, containing 22 modern apartments, at 3008 Howard Avenue for P. E. Sullivan. Work will cost \$60,000.

Wash., Everett—Office—H. C. Hodges and associates will erect a 5-story concrete building, costing \$100,000, 48 x 115 ft., for use of physicians and surgeons.

Wash., Seattle—Apartment—Murdoch & Eckman, Thompson Building, have received contract for a 2-story group of buildings, including three separate apartment structures and 24 garages. The construction will cost \$200,000.

Wash., Snohomish—School—Snohomish School District will erect two 2-story additions to Snohomish schools during the summer, to cost approximately \$80,000. Stephen, Stephen & Brust, architects, Seattle.

Wash., Bremerton—Y.M.C.A.—Lawton & Moldenhour, architects, Alaska Building, Seattle, are preparing plans for a 5-story and basement addition to the Navy Yard Y.M.C.A. to cost \$150,000. Building will be 101 x 120 ft., steel and concrete.

Highways

Ariz., Phoenix—Bills will be called for soon by state highway department, for paving four miles of the Marinette-Hot Springs Junction Road, west of Marinette. The pavement will be 18 ft. wide, 6 in. thick. A 130-ft. bridge across the overflow channel of Agua Fria river is included in specifications. Frank R. Goodman, Phoenix, state highway engineer.

Ariz., National Park Road—Bids are being received by superintendent of the Grand Canyon National Park, for surfacing with asphalt concrete, the Hermit Rim Road in Grand Canyon National Park, in accordance with plans and specifications on file at office of the superintendent, Grand Canyon, Ariz. Arno B. Cammerer, acting director, National Park Service.

Calif., Santa Barbara—A road improvement district in Mission Canyon has been formed to pave a portion of the tunnel road which opens up the territory around the southern terminal of the tunnel to the Gibraltar dam. The district comprises approximately 1000 acres.

New Mexico, Alamogordo—A report from the capital states that an appropriation of \$6,000 a mile has been approved for the 34-mile stretch of road between Oro Grande on the Alamogordo-El Paso highway, and work will be started soon. The ten concrete spillways between Alamogordo and Valmont are to be taken up and replaced. In Otero county the construction of a stretch of 12 miles between Weed and Pinon is projected. George Leslie of Santa Fe, representing the bureau of roads, surveyed the project a year ago, estimating the cost at \$60,000. Forest service has offered to provide \$45,000 if the county and state furnish the remainder.

Wash., Bellingham—Charles E. Lind, local contractor, and the Sloane Construction Company

of Spokane, have been awarded the government contract to relocate 5.9 miles of the Mt. Baker Highway between Glacier and Excelsior. The bid was \$119,695.

Wash., Mt. Vernon—Skagit County Commissioners have appropriated \$80,000 for the construction of a five-mile highway into Anacortes. A like amount will be given by the state, and construction work will start during the summer.

Wash., Bellingham—Whatcom County Engineer Fred W. McElmon's plans for paving 2.5 miles of highway from Saxon to Wickersham have been approved by the state highway supervisor, and bids will be called for at once.

Wash., Olympia—State Highway Commission will receive bids until June 26 for the following highway work: clearing, grading and draining 11.32 miles of the Inland Empire Highway, between Palouse and Whitman in Whitman County; grading, draining and paving with concrete 1.3 miles of Inland Empire Highway, from Waitsburg northeast in Walla Walla County; constructing reinforced concrete arch bridge over Goldsborough Creek on the Olympic Highway in Mason County; constructing timber trestle and bridge, 1100 ft. long, in Pacific County over the Palix River.

Irrigation Projects

Calif., Susanville—Contract for construction work on the Red Rock irrigation district reservoirs and distributing systems near Ravendale has been let to P. J. Hopper, of Susanville, contractor. The system will furnish water for 23,515 acres of land. The storage system is composed of three reservoirs. The distributing system provides a direct supply of water for every user. Thomas H. Means has been engaged as consulting engineer on the project.

Wash., Walla Walla—Dr. J. W. Summers, representative of the fourth congressional district, and Harry Phelps, manager of the Burbank irrigation district, have received telegrams from O. C. Merrill, executive secretary of the federal power commission, which will permit the immediate construction of the wing dam on the north bank of the Snake river, for which land owners of the district have strived for several years. Construction will begin as soon as the river recedes. The dam will be in operation this year.

Wash., Bellingham—A bill providing for the reclamation of 3,400 acres of tidelands along the western shore of the Lummi Indian Reservation by the construction of two dykes, one to cost \$1,000,000 and the other \$50,000 is being prepared by Government and Whatcom County officials. The bill will be submitted to Congress by Representative Lin Hadley. Plans include leasing the reclaimed land to white settlers.

Power Plant Equipment

Calif., San Francisco—A large electric power plant is to be erected in the heart of the financial district of San Francisco, according to an announcement by the Pacific Gas & Electric Company. This plant, which is to be designated as substation "J" will eventually contain eight 2,600-kw. rotary converters, by means of which the electric light and power demand for that section of the city will be amply supplied.

Railways

Calif., Los Angeles—Double tracking of the Angeleno Heights portion of the Edgeware road line has been started by the Los Angeles Electric Railway and work on other extensions will start at once. This is a part of a \$6,000,000 program of extensions and improvements planned by the street railway company.

Calif., San Bernardino—A. T. & S. F. Ry. has appropriated \$840,000 for new structures and additions to the railroad shops and yards at San Bernardino. The work includes a new machine shop, tin shop, and pipe shop costing a

total of \$740,000 and a turntable costing \$100,000. Acting general manager W. K. Etter, A. G. Wells, vice-president, A. G. Armstrong, superintendent of shops and W. B. Storey, president, have been on the site looking over the yards.

Mex., Tepic—Utah Construction Co., 820 Phelan Bldg., San Francisco, was awarded contract May 15, by Southern Pacific of Mexico Ry., for grading and tunnel work of the 82-mile gap on the 110-mile right-of-way to be constructed between Tepic and LaQuemada. The contract involves construction of entire line with the exception of a 10-mile stretch immediately south of Tepic, awarded to Twohy Bros. of Phoenix, and a short piece from LaQuemada north of the mountains, awarded to another firm. Rail will be laid by the railroad company. The Utah Construction Co. contract involves moving over 3,000,000 yd. of earth and rock; the construction of 33 tunnels, approximately 26,000 lineal ft., and the erection of steel bridges involving 11,000,000 lb. steel. The total contract amounts to about \$6,000,000. W. E. Wattis is president of the construction company.

Wash., Seattle—Grant Smith & Company, Seattle, and MacDonnell, Ltd., of Calgary, received the contract for grading 50 miles of the Canadian Pacific Railway in the Tuffnell Northwest-erly branch. The work will cost between \$200,000 and \$225,000.

Wash., Everett—C. McDonough, superintendent of the Cascade Division of the Great Northern Railway, at Everett, announces that work costing more than \$125,000 will be started at once. Work includes a new wood-working plant, at the Delta Yards in Everett; 7 miles of curve rail near Skykomish to be replaced with 130-lb. rails.

Street Lighting

Calif., South Pasadena—Bids are being received by city trustees for constructing ornamental lighting system in Camden and Court Aves., involving ten No. 500 single light concrete posts, equal to that manufactured by the Cement Products Co., equipped with Novalux unit No. 8.

Calif., Fresno—City Engineer Wm. Stranahan has completed plans and protests will be heard June 14, for a lighting system on Van Ness Blvd., and other streets, under 1911 Act. The system will involve 99 ornamental electroliters.

Calif., Los Angeles—Bids are being received by Board of Public Works for constructing ornamental lighting systems in Western Ave., between Hollywood Blvd., and 50 ft., n. of Lexington Ave. Specifications on file at office of city electrician, 203 n. City Hall Annex.

Calif., San Diego—Southern Electrical Co., Third and E. Sts., submitted low bid to city council at \$12,994 for installation of electric ornamental lighting system on Broadway, from 8th to 16th Streets, including 52 reinforced cement concrete lighting posts, underground conduits, electric wires, pipes, lamps, globes, sockets, etc.

Calif., San Diego—A. C. Rice, 1963 Santee St., Los Angeles, was awarded contract by city council at \$8662 for installing lighting system in La Jolla.

Streets and Sewers

Ariz., Tucson—City Council has voted to secure \$55 additional acres for the city sewer farm. Total estimated cost of the disposal works \$21,000. The farm will have a total acreage of 590 acres. It is probable that a bond issue will be voted to cover the sewage disposal system and the cost of constructing a new incinerator.

Ariz., Tucson—Resolution of intention No. 776, adopted by city council May 7, for improving Sixth St., between Stone and Park Avenues, by grading and paving, constructing curbs, walks, gutters. Competitive bids will be asked for on

1½-in. Warrenite-bithulitic on 2½-in. bituminum base; 1½-in. asphalt type Willite surface on 2½-in. bituminum base; or 5-in. cement concrete. L. O. Cowan, city clerk.

Calif., Long Beach—City Engineer A. L. Ferver has completed plans for the construction of a 24-in. sewer in Broadway Alley, E. American Avenue, and Ocean Park Avenue, to carry the overhead in the business section. Estimated cost, \$30,000. Plans will be presented to the City Council shortly.

Calif., Riverside—H. D. Churchill & Co., 350 Merrick Street, Los Angeles, have signed contract for construction of approximately 11 miles of sewer work, awarded some time ago. The work totals about \$117,000 and will take about six months.

Calif., Hollister—Bonds in the sum of \$48,000 to construct a septic tank and filter beds across the San Benito River and to make much needed improvements within the city carried at a recent election.

Calif., Whittier—Harvey N. Hanawalt was awarded contract for installing of a portion of the big outfall sewer. Cost, \$48,000.

Calif., San Bernardino—City Engineer C. E. Johnson states that plans for the proposed deep sewer for Third Street and E. Street, will be ready in about a month. This sewer will permit the draining of basements and sub-basements and will make possible the erection of class "A" structures.

Calif., Los Angeles—Bids will be called for shortly by the Board of Public Works for the construction of four sections of the sewer system to connect Sawtelle or West Los Angeles district with the main city outfall. This work will be done under the \$12,000,000 bond issue of which bonds to the amount of \$2,000,000 have been sold to Blair & Co., funds from which will be used in the various preliminary parts of the projected sewer system for greater Los Angeles.

Colo., Denver—Monohan & Cunningham have been awarded contract for the layout of South Denver Improvement District No. 16 on a bid of \$82,999.50.

Ore., Astoria—The Astoria city commission at a special meeting this morning awarded a contract to the John Slotte Company of this city for the rebuilding of the streets in the devastated district of the city. The commission also approved the recommendation of City Manager Kratz and Commissioner Skyles by adopting the chair or stepdown type of wall. The bid for this was \$282,798.20, or about \$12,000 less than the bid for a straight wall. Work is to be completed within 90 days.

Wash., Burlington—Contract for paving and graveling of the residential districts has been let to Norris Bros., Mt. Vernon, Wash., on their bid of \$39,473.80. Contract provides a 6-in. concrete pavement.

Wash., Tacoma—Contract for resurfacing North Yakima Avenue, Division to 13th Street, has been let to C. E. Torkelson, Tacoma, for \$39,500 providing for bithulitic surface.

Wash., Aberdeen—Contract for paving of Alder Street awarded to Haukeli, Hegg & Co., on their bid of \$29,980.50.

Wash., Tacoma—City Engineer J. C. Manley is working out a plan for the construction of a large sewer conduit in the Gallagher Gulch District which will eventually form the outfall for all the storm and sanitary sewers of the southern end of the city. The work is estimated to cost \$75,000.

Wash., Seattle—Contract for the installation of sewers in 62nd Avenue South has been awarded to Felix Arcorace & Company, of Seattle, on their bid of \$98,974 for clay pipe. Work involves about 26,000 ft. of pipe, 8 to 27 in.

Wash., Chehalis—Contract for paving State Street, etal awarded to Albers Construction Co., Chehalis, at \$19,177.

Wash., Raymond—Contract for paving First Street has been awarded to R. L. Rowland, Seattle, on a bid of \$32,268.79 for 8-in. concrete-paving.

Wash., Seattle—Improvements on streets, sewers and bridges, and repairs to damages resulting from slides, estimated to cost more than \$700,000, will be necessary for the next twelve months in Seattle, according to reports of street and engineering departments. The largest item is the proposed bulkheading of Harbor Avenue-Southwest and Alki Avenue, to cost \$100,000.

Waterworks

Ariz., Flagstaff—Flagstaff will utilize additional springs in the San Francisco mountains by the completion of a dam on Banning Creek, creating a 22-acre reservoir holding 110,000,000 gal. of water.

Ariz., Tucson—Improvements are proposed embracing the construction of a large reservoir providing the city with a gravity water system, the extension of city mains to sections of the city now without water, etc. It is estimated that a bond issue of a million and a quarter dollars would be sufficient to cover these plans, including the sewer farm extension, the construction of the proposed incinerator, the building of a storm sewer in the arroyo between Fourth Avenue and Stone, according to a talk which City Engineer G. H. Atchley made before the Kiwanians.

Calif., Santa Barbara—Montecito water board has received approval of the proceedings for the \$800,000 bond issue from O'Melveny, Milliken, Tuller & McNeil. Leeds & Barnard, Central Bldg., Los Angeles, have been engaged as consulting engineers on the project, and are now at work on detailed plans for the water tunnel to be constructed in Toro Canyon.

Calif., Belvedere—Belvedere Water Corporation which has been organized to take over the property and service of the Belvedere Water Company, serving the Belvedere district east of Los Angeles city limits, has applied to the California State Railroad Commission for authority to transfer and to issue \$300,000 first mortgage bonds to pay for same and to make necessary additions, improvements and betterments to its system.

Calif., San Bernardino—City Council is discussing a bond election to vote an issue of \$80,000, for the purpose of providing funds to bring the Devil Canyon waters to the city. It would involve drilling two wells and necessary reservoirs. F. C. Finkle, hydraulic engineer and C. E. Johnson, city engineer.

Calif., San Diego—Bids will be called for shortly for the construction of a wood stave pipe line from Lower Otay reservoir to Bonita. Plans and specifications prepared by H. N. Savage, hydraulic engineer. The work will be done under the recent \$450,000 bond issue. The pipe line is planned to give the city an additional carrying capacity from the impounding to the water distributing system.

Calif., Los Angeles—Mexican Petroleum Company has been granted a franchise to build 28 miles of pipe line from Santa Fe Springs to the coast. The company contemplates the construction of refineries, storage farms, and pumping stations, totaling about \$15,000,000. The pipe line referred to will cost \$150,000.

Wash., Davenport—Bids will be received until June 27 by the City Council for supplying materials and labor required in constructing additions to Davenport water supply system. Work includes a 150,000-gal. elevated water tank, laying 900 ft. of 8-in. main; changes in piping system at pump house.

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